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EUROPE & LATIN AMERICA

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FIAR PLANS PRODUCTION OF GALLIUM ARSENIDE SOLAR CELLS

Milan L'ELETTRONICA in Italian No 3, Mar 87 p 294

[Text] Gallium arsenide cells developed by CISE [Center of Information, Studies, Experiments] will be manufactured by FIAR (Milan), as established by the recent agreement between the two companies. This agreement will be implemented in two 3-year phases. The first one, partly financed by the CNR [National Research Council] National Space Plan and already underway, will complete the study and design of the cells. During the second phase, researchers will develop the welding techniques for the cells, defining the qualification procedures for the cells and developing a pilot production line for industrial production.

This agreement exploits the extensive expertise of the two companies at a European level, joining the ranks of other similar initiatives that are currently being implemented in the U.S. and Japan.

CISE has been involved in the design and production of these cells since 1975, and in 1983 the organization launched a special program for the application of these components in space missions. In this connection we should mention the use of the CISE cell on the Space Shuttle for an international calibration experiment, as well as the ASGA experiment on the European space platform, currently being prepared.

At present, CISE can supply limited quantities of gallium arsenide cells with different characteristics suitable for various applications, such as electricity generation in space, in terrestial solar concentrators, and applications in fiber optic telecommunications and sensors. Compared with silicon cells, GaAs cells offer higher conversion efficiency, good electric behavior at high temperatures, and good resistance to proton and electron radiation.

The features characterizing the GaAs cells produced by CISE for space applications include: spectrum sensitivity ranging from 350 to 900 nm; dimensions up to 2x4 cm^2; thickness 200 ÷ 300 μm; conversion efficiency (AMO) 15 ÷ 17 percent; no-load voltage 0.95 ÷ 1.0 V and short circuit current 25 ÷ 30 mA/cm^2 (AMO, 1 sun); operation in concentrations of up to 1,000 suns; radiation resistance (P/P_0 = 0.78) of 10^{15} electrons per cm^2 (1 MeV).

8606
CSO: 3698/M246

FRG: OSIRIS MATERIALS RESEARCH IN MICROGRAVITY GETS DM 5.4 MILLION

Solothurn CHEMISCHE RUNDSCHAU in German 6 Mar 87 p 1

[Article: "Materials Research in Space: Single-Crystal Blades"]

(BMF)--Several firms and the Foundry Institute at the technical university in Aachen have begun a joint project to research how microgravity can be used by industry to optimize the material properties of components. The OSIRIS (oxide-dispersed single crystals improved by resolidification in space) project is initially expected to run for three years.

The project, which is being supported by the BMFT (Federal Ministry for Research and Technology) with DM 5.4 million, is a new idea in the area of materials research in microgravity. It encompasses several problem areas which are being researched by means of individual experiments in an earth-bound laboratory, such as have already been performed in Spacelab, and over the long term links them with a common, technically feasible objective. The crux of the matter is the stability of a suspension of oxide particles within molten metal, the interaction of the particles with the advancing solid-liquid interface, the directional single-crystal solidification of super alloys and the directional solidification of preformed parts with complex geometries. In addition to solving scientific and technological problems, the project should also allow estimates of how to utilize the results. As an applications-related example, turbine blades are to be investigated. They are of enormous economic importance because they are used in steady-state and non-steady-state turbines to provide energy. The super alloys employed to date represent the current state of the art with respect to desirable properties such as high-temperature resistance. The price of these blades is in the neighborhood of several thousand marks per blade weighing approximately 100 grams. Therefore, in the case of even modest improvements, space-based production is of great economic interest.

Worth It

It is not yet possible today to estimate the expected increase in quality of single-crystal, higher-dispersion blades produced in microgravity. However, if the permissible material temperature can be increased by 50 to 100 degrees celsius, production in space could well prove very worthwhile. Recognizing this fact, potential alloy manufacturers and users (MAN, MTU, Thyssen, Krupp), as well as corresponding research institutions, have come together in this joint project. They are cooperating on the development of super alloys and on the preparation for and performance of materials-science experiments in space.

12552
CSO: 3698/383

BRIEFS

SWEDISH SPACE ALLOYS PRODUCED--A successful experiment in the field of materials research has been conducted in a prope rocket from Esrange in Kiruna. Twelve different experiments were conducted. Most involved the fusing of metals that are incompatible on earth, but can be joined together under weightless conditions. Silver and zinc are two such metals. The weightless condition lasted 7 minutes and 15 seconds, according to NORRLANDSKA SOCIALDEMOKRATEN. One possible result of the experiment is that industrial companies from around the world could order rare alloys that are in great demand from Esrange. Three more probe rockets will be sent up for additional experiments. [Text] [Stockholm NY TEKNIK in Swedish 14 Apr 87 p 10] 9336

CSO: 3698/413

AIRCRAFT PURCHASES FOR FINNAIR ANNOUNCED

Two Billion Markkas: 4 MD-11'S

Helsinki HELSINGIN SANOMAT in Finnish 2 Apr 87 p 3

[Article: "MD-11 is Finnair's Long Distance Aircraft for the 1990s"]

[Text] Finnair is replacing the DC-10s manufactured by the American McDonnell Douglas with the new MD-11 aircraft made by the same company. The advisory board of the state airlines has decided on a deal which includes 2 definite purchases and 2 purchase reservations or options.

The price of Gunnar Korhonen's last major deal before his retirement in the summer was not revealed, but altogether the purchase of the 4 MD-11 aircraft should cost about 2 billion markkas. The greatest portion of this would be borrowed by Finnair from an US export credit institution, the Eximbank.

The European alternative, Airbus A340, which has not even received a development decision yet was left in a second place during the unusually brisk sales competition. Finnair did not trust in its promise primarily because no suitable motor was available for it.

The first MD-11 will be put to use in Finnair's long distance flights in October 1990.

Details of MD-11 Purchase

Helsinki HELSINGIN SANOMAT in Finnish 2 Apr 87 p 30

[Article: "Finnair Chose the MD-11"]

[Text] Finnair has bought from its "court purveyor" of decades, the American MC Donnell Douglas company, 2 new MD-11 aircraft and made a reservation for 2 other aircraft.

The price of the major purchase will not be published but according to information obtained by HELSINGIN SANOMAT the aircraft costs about 90 million dollars, or at the present exchange rate about 400 million markkas apiece. If Finnair takes all 4 aircraft, the total price would be about 1.6 billion

markkas. With spare parts and other accessories the cost of the investment could rise to the level of 2 billion markkas.

The first aircraft intended for long routes and charter flights, a 3 engine MD-11, comes to Finland in October, 1990. The aircraft will transport 271 passengers on regular routes and 385 on charter flights.

MD-11 beat the European Airbus Industry's 4-engine A340 craft in stiff competition. According to Finnair President, Gunnar Korhonen, the motor turned out to be the decisive factor.

The adoption of the new type SuperFan motor for the European craft had been postponed to the distant future and at the same time the entire A340 venture is more seriously threatened than ever before. "The A340 has many technical details that worry a small airline. Reliability is very important for us," said Korhonen.

Reliability is represented expressly by the MD-11, which is about 70 percent identical with its predecessor craft, the DC-10 now used by Finnair for its long distnace flights. Mc Donnell Douglas made its decision to build the MD-11 only at the close of last year. The first craft will be put to use in the spring of 1990 or a few months before Finnair gets its own.

The agreed upon delivery time for the second Finnair MD-11 is May 1991. If the reservation for the third craft is changed into an order the craft will be relinquished in April 1993 and the fourth a year later. The decision to change the reservation order into a binding order has to be made 30 months before the planned delivery time.

Finnair plans to make the sizeable MD-11 deal with cash on the barrelhead The leasing practices that have become increasingly generalized in recent times will not be employed.

The details of the funding package are still to be worked out but half of the required loan will be provided the US export credit institution, the Eximbank. It has promised credit to Finnair for the first time without credit from the Finnish government, which Korhonen considers as evidence of the trust felt toward Finnair as well as of the eagerness of the Americans to sell.

New Company to Further Exports

In connection with the deal an agreement was made for the formation of a new Finnish-American company, the purpose of which is to further the export of Finnish goods to the US and also third world countries.

McDonnell Douglas has promised a million dollars as basic capital for the company. This amounts to 4.5 million markkas which sum is also sought from the Finnish side. This does not necesarily have to come from Finnair but other interested companies can also be considered. According to Korhonen such companies have been found.

Finnair has floated these kinds of reciprocal trade clauses into earlier trade agreements made with McDonnell Douglas, but due to lack of proper organization success thus far has been moderate. On both sides of the Atlantic there exists only one salesman arranging reciprocal deals and one secretary, who, for the present, have put together export deals worth about 10 million dollars.

These include also our own small scale parts manufacture for Douglas. At present the companies are negotiating about the manufacture of MD-80 aircraft parts, but no discussion has yet been held about MD-11 parts.

Nordic SAS has frozen its own 12 aircraft MD-11 order until the end of April and tied it to negotiations being held with US officials about routing rights. According to Korhonen such discussions were not part of the Finnair MD-11 negotiations, nor are they supposed to be held according to the rules of the trade and customs organization Gatt.

Nevertheless Finnair also has an example of this kind of coupling. The company purchased ATR aircraft from France for domestic flights only after getting a green light for its long desired non-stop flights to Paris.

Finnair A340 Purchase Cancelled

Helsinki HELSINGIN SANOMAT in Finnish 2 Apr 87 p 30

[Article by Jyri Raivio: "Lack of Faith Felled A340 Deal"]

[Text] "There are signs that the A340 deal will be either cancelled in its entirety or will at least be postponed to a considearably later date."

Among others, this internationally significant news for the aviation industry, was used by Gunnar Korhonen to justify concluding his career's last major aircraft deal, once again with the previous supplier, McDonnell Douglas. Finnair performed a great task in the choice of its new long distance equipment and the final decision was inevitable.

The first to be dropped from the 3 choices available was the American two engine Boeing B-767. Its undeniable economic efficiency, according to Finnair's technical director, Esko Kukkonen, could not compensate for those drawbacks and expenses which the transition to an new aircraft by an entirely new manufacturer would have entailed.

MD-11 and A340 were left and no significant differences could be discovered in their cost estimates.

The European craft was dropped for uncertainty about its engine. IAE, a cooperative venture by 3 large engine factories, had been developing a new type SuperFan motor for the long distance Airbus which originally was expected to be ready by the spring of 1991 at latest. Now there is no certainty about this date or about the entire SuperFan.

The A340s with their older CFM56 motors certainly can not compete on the international markets. Thus at the Finnair some are almost ready to take bets that the A340 project will never be realized.

There should be no surprises in regard to MD-11, since the aircraft hardly has any ultramodern and at the same time questionable technology.

Also the engines of the new Finnair craft, the GE CF6-80C2s, are nearly the same as those of the DC-10s although their fuel efficiency has been greatly improved from that of the DC-10s.

MD-11 is 5.7 meters longer than the DC-10. Outwardly the most obvious difference is in the turned up wingtips or the so-called winglets, which decrease the wings' resistance and thus the fuel consumption.

In the cockpit the greatest change is in going from the 3 pilot cockpit of the DC-10 to a 2 man crew. At the same time the present electromechanical instrument tangle will be replaced by video monitors.

Finnair fleet now has 6 widebodies, or, in addition to the 4 DC-10s, 2 Airbus A300 craft painted with the Karair colors. One of the DC-10s however has been rented to Yugoslavia for a year and a half.

The company has not yet made a decision about the fate of the DC-10's once the MD-11 arrives. The presently estimated growth of long distance flights is sufficient to employ even 9 widebodies, or 4 MD-11's, 3 DC-10's, and the Airbuses. If the annual growth of chartered flights falls below the estimated 6 to 8 percent, some of the DC-10's may be sold or rented elsewhere.

12989
CSO: 3698/378

PLANS FOR MACHINE-TOOL, PRODUCTION ACTIVITIES AT RENAULT

Paris INDUSTRIES ET TECHNIQUES in French 2 Apr 87 p 39

[Article by G.L.G.: "Renault: A Concern for Efficiency"]

[Text] Raymond Levy announced new decisions concerning four of Renault's operations.

Raymond Levy is going fast. Less than 3 months after becoming Renault's chief executive officer, he announced his decision to sell American Motors to Chrysler. Immediately after that, at the last meeting of the central work's council, he announced four decisions: to close Bernard Motors; to concentrate machine-tool manufacturing out of Billancourt; to sell to specialized companies a majority interest in subsidiaries making wheels and seats. Four activities affected quite differently, but with one point in common: a concern for efficiency.

Bernard Motors has had problems for several years, with losses amounting to between one third and one half of its sales. Sales dropped from Fr291 million in 1984 to Fr119 million in 1986. The 1984 agreement with the Swedish company Electrolux could not stop the decline in the production of small industrial motors. Negotiations for a takeover by Italian companies, first with Lombardini then with Tecnamotor, having failed, Bernard Motors will disappear. At Rueil (Haut-de-Seine) 178 people are laid off. There remains only the customer service department with 20 people.

However, Renault will continue to manufacture machine-tools. These are special machines designed for the automobile (car body fabrication) as well as other industries such as the aeronautical and armament industries (transfer machines and flexible workshops). Depending on contracts, sales vary much from one year to the next: Fr318 million in 1986, but Fr700 million expected in 1987, in particular because of the delivery of flexible workshops to SNECMA and Case-IH. There used to be three production sites. Only two will be retained. Billancourt (137 people) will close at the end of 1987. Its operations will be transferred to Castres (Tarn, 450 people) and Beauchamp (Val d'Oise, 220 people) where Fr45 million were invested in 1985-1986.

The Saint-Satur Foundry and Workshops (in the Cher; 313 people and Fr133 million in sales) produce aluminum wheel rims and cast iron. Since 1984,

Kelsey Hayes, a subsidiary of the U.S. company Fruehauf and the leading wheel manufacturer worldwide, owns 49 percent of Saint-Satur's stock. Its share will be raised to 66.6 percent, Renault retaining the rest.

Sotexo (at Somain-Aniche in the Nord; 250 people and Fr170 million in sales) used to supply seat covers. They were added to the seats at the Douai and Maubeuge factories by 140 people who will get other jobs. Bertrand Faure, the leading European seat manufacturer, will take over 49 percent, and later on 51 percent, of Sotexo; Renault will retain 49 percent. Bertrand Faure will manufacture seat assemblies at Sotexo, which will hire 150 people.

With Kelsey Hayes as with Bertrand Faure, Renault chose to deal with partners, privileged suppliers which will provide for "just in time" deliveries.

Georges Besse had already sold some operations and had been looking for partners. Raymond Levy will follow in his tracks. Much remains to be done, especially in the fields of agricultural machinery and non-automotive operations, although these represent only 5 percent of total sales. The essential, therefore, is to improve the productivity of the automobile branch, as Michel Praderie, Renault's manager of personnel and employee relations, pointed out in the interview he gave us.

9294
CSO: 3698/462

FRG'S OPEL HAS 'MOST ADVANCED' PRODUCTION TOOLS AT PILOT PLANT

Paris INDUSTRIES ET TECHNIQUES in French 2 Apr 87 pp 50-51

[Article by special correspondent Michel Defaux: "Ruesselsheim, Opel's Pilot Plant"]

[Text] To introduce the Opel Omega, the manufacturer has focused its efforts on stamping, body assembly and assembly... Three sections of its production plant which have become the best in Europe.

At Opel in Ruesselsheim, a few kilometers from Frankfurt, when they talk about the factory of the 1990's, they do not unfold blueprints! They merely push the doors of buildings K40 and K130.

Set into service about 7 months ago, after its modernization, it produces 850 Omega cars per day. When full production rate is achieved, toward the end of the year, the management expects to reach a rate of 1,140 vehicles.

A total of DM2 billion were invested in the Omega program (i.e. about Fr6.6 billion), over 50 percent of which for new buildings, modernization and the replacement of the production plant.

The first shock is the impressive battery of transfer presses used for stamping in hall K40. Something unique in the world! Six press assemblies connected by transfer lines cut out blanks and stamp body parts.

This is the result of close cooperation with German machine-tool manufacturers, Schuler for punching and Weingarten for stamping. "We thus eliminated 16 lines of traditional presses," Volker Haas, production manager, indicated. The machines have impressive dimensions (the largest is 40zm long, 7 m wide and 10 m high and has a force of 4,000 tons) and allow very high production rates: the management claims that they have a maximum rate of 25 strokes per minutes, which means that a single transfer press will manufacture 30,000 Omega doors per 20-hour working day. Starting with a 10-kg sheetmetal blank, a few seconds and 5 press strokes are enough to manufacture in a single operation all the parts required to make 2 doors.

To ensure such a production rate, one of the first things to do was to eliminate downtime and dead times. Thus, to change tool sets (dies, part

installer, transfer), operators prepare and adjust them in masked time on an adjacent line (10 to 20 die sets can thus be handled). The transfer is then made on floor rails: 40 motors and adjusting actuators complete the difficult die change without any human intervention. This operation used to take several hours: today, production of a new part can be started in 8 minutes. This performance makes for great flexibility, as transfer presses produce a total of 70 different panels.

The second characteristic of the Ruesselsheim factory is the very high degree of robotization of the body assembly workshop. They claim it is the most modern workshop in Europe! Indeed, Opel has spared nothing: 239 industrial robots and 50 welding presses automatically execute 4,200 weld spots on every car body. The exact breakdown is as follows: 3,130 weld spots, i.e. 75 percent, are made by robots; 1,022 by traditional multipoint presses; and 40 difficult or hard-to-access weld spots are made by hand.

The large number of robots is due to the introduction of robotics in the preparation of body subassemblies. Until now, they were made on high-performance but non-flexible multipoint machines.

Only two robot brands are represented: the General Motors Fanuc joint venture, which sees GM factories as its captive market, and Kuka. "We decided on these two suppliers mainly for reasons of delivery time," Rolf Zimmermann, in charge of body subassembly engineering, pointed out. "Also, we wanted to limit the number of suppliers to simplify maintenance."

As far as robot environment is concerned, Opel engineers have gone one step further and made systematic use of automatic feed systems. These range from the traditional vibrating bowls for small parts to monorail electric conveyors equipped with lift-and-lower stations for larger body parts. When the parts are not suitable for this, the welding line is fed from buffer inventories via jogging-type feed lines (the factory chose not to adopt a Kanban-type organization and operates with intermediate mini-inventories). The parts are then taken over by manipulator arms and automatically set into place before the welding cycle.

Another interesting trend: on the clamping setups, on the robot grippers, there is a multitude of lighted red dots. Contactless proximity sensors continuously check the positioning of the parts. They cost more to install but will prevent collisions with grippers and rejects.

When it comes to robot programming, we were somewhat disappointed; off-line CAD programming is not fully developed yet and the shop is still using traditional programming through pushbutton banks. Only one innovation is expected as far as equipment communication is concerned; the factory is said to be ready to adopt the MAP standard that is so dear to its parent company...

Once assembled, the body shell is provided with its doors before being sent to the paint shop. Here, Opel uses an unusual technique: the rear and front doors arrive with their hinge pins already welded in place. They are grabbed by a manipulator arm and automatically positioned in the door opening. Two operators arc-weld the hinge brackets on the car body. That is all there is

to it: this eliminates any possibility of door panel misalignment, and no further adjustment is required. The reverse operation is performed after painting: the disassembled doors are provided with bar code labels and hung from an electric monorail which takes them to the trim department. The vehicle goes down the assembly line without its doors, which makes it easier to add components such as seats.

Upstairs, offline preparation and division into modules take place; for these, Opel is undeniably ahead of others, in Europe and worldwide (it is rumored that the managers of the Saturn program paid several visits to Ruesselsheim). When the doors arrive in the preparation area, they are deposited on a wire-guided cart which also carries all the necessary components: screws, joints, windows, armrests, locks, loudspeakers, etc. The same approach was adopted for dashboard assembly.

And in this shop, which is the size of three football fields, an armada of 479 wire-guided carts (DM35,000 each) serve the 165 work islands. At each station, operators complete the same comprehensive tasks and set their own working rates. For instance, the dashboard and front body panel module, which consists of some 400 parts (steering wheel, toe board, heater, radio, windshield-wiper motor, control levers, etc.) is assembled in 17 minutes.

The other advantage of such a preparation is quality control prior to assembly on the vehicle. Before going down to the final assembly line, the wire-guided cart brings the dashboard to a computerized control cell. After plugging in a connector, the operator checks the operation of all accessories. The same goes for doors: the electric functions of the window actuators, rearview mirrors, etc. are checked. The final operation consists in sorting out the doors and dashboards according to the controls that equip them, and they are then assigned to the corresponding car bodies within 75 to 105 minutes after completion of all operations in the modular manufacturing area.

The assembly of the completed doors is similar to the process previously described. On the other hand, the automatic installation of the dashboard is quite spectacular. First, at a station preceding the assembly proper, two robots spread a bead of polyurethane adhesive (bonding and sealing) over a length of 3 m. The adhesive is deposited in a transversal groove 8-mm wide within which the dashboard centering joint will be fitted. The robots spread out the adhesive evenly, slowing down in curves and accelerating on straight lines. When this operation is completed, the installation cycle begins: the dashboard assembly is slowly lowered vertically through the windshield opening. It is then pressed into position into the adhesive-covered groove and bolted into place. Cycle time: about 1.1 minutes.

After that, the engine, axles and wheels still have to be added by traditional methods; 17 hours after its production started, the Omega is ready to drive off.

9294
CSO: 3698/462

SWEDEN: PHARMACEUTICAL, BIOTECHNOLOGY MERGERS PLANS, SUCCESSES

Pharmacia, Astra Officials Interviewed

Stockholm SVENSKA DAGBLADET in Swedish 30 Mar 87 ekonomi special pp II-III

[Interview with Elof Johansson and Sune Rosell, vice presidents in charge of research at Pharmacia and Astra, respectively, by Lars-Georg Bergkvist and Lennart Moberg; date, place, and occasion not given; "They Are in Close Agreement"]

[Text] Biotechnology is totally misunderstood. It will not be the young upstart companies in the United States leading in development, but the established pharmaceutical companies. By combining the revolution of knowledge in the new field of biology with traditional research, they will produce an entirely new generation of custom-made pharmaceuticals during the 2000's.

Elof Johansson and Sune Rosell are in close agreement on this vision of the future. They are vice presidents and research chiefs at this country's major firms in biotechnology and pharmaceuticals--Pharmacia and Astra, respectively.

SVENSKA DAGBLADET brought them together to talk about the future of biotechnology and the pharmaceutical industry.

SVENSKA DAGBLADET: The world's pharmaceutical industry is suffering from a dearth of products. Will biotechnology be its salvation?

Sune Rosell: Yes, but not in the way many people believed. The genetic code was broken in 1953. That initiated an enormous amount of basic research and led to a knowledge revolution. Now we have a foundation. I am convinced that it will bear fruit.

Elof Johansson: I would not call this biotechnology or speak of a new biology. It has taught us how cells "talk" with one another. It is the disturbances in their communications that lead to diseases.

This is what led to the great advances. People have focused too much on the specific substances that can be produced by DNA technology and given directly to people.

SVENSKA DAGBLADET: Who will convert this knowledge into finished pharmaceuticals? The new American biotechnology firms?

Elof Johansson: No, I have looked at the 300 biotechnology firms in the United States that were started between 1978 and 1983. Seven or eight of them will survive. It appears that all of them used the same consultant when it came to choosing projects. Whichever firm comes in first, second, or possibly third can recover its investments, but producing the 18th insulin or the 25th growth hormone will never be profitable.

Sune Rosell: People have talked about poor conservative Astra which has not understood what is going on, but simply invested in ordinary low-molecular compounds.

The situation is not that simple. Apart from growth hormones, insulin, and perhaps 10 or 12 other substances, the final products that can be produced by the new biotechnology are not particularly suitable as medicines.

A Poor Medicine

Take insulin, for example. It is actually a poor medicine. You must inject it, often several times per day. Now that we have used the new biology to learn much more about the structure of insulin, it is becoming possible to produce genuine, low-molecular medicines.

With this new knowledge, we will be able to custom-make medicines in the future. We know what the keyhole looks like, so we can also make the key.

Elof Johansson: I believe we will have a totally new generation of old, tried-and-true medicines.

SVENSKA DAGBLADET: Will we have less expensive medicines then?

Sune Rosell: No, we will not move faster. We must use the same tests as today. Just like today, a new drug will take 10 or 15 years to develop and it will cost 500 million kronor.

SVENSKA DAGBLADET: What diseases are most likely to have new drugs in the near future.

Neither Sune Rosell nor Elof Johansson dared to guess. It depends entirely on where research makes a breakthrough.

SVENSKA DAGBLADET: Who has created bull market in the new biotechnology firms? Market analysts? Politicians? Company executives?

Sune Rosell: Some of our research colleagues--and they include Nobel Prize winners--are also responsible. They have seen the enormous possibilities, but not really understood the conditions that are required to produce pharmaceuticals.

An idea and a substance are not enough. An enormous development apparatus is also needed in order to test, document, and discover side effects. These resources are found at the traditional pharmaceutical companies.

Enamored Of Own Project

Elof Johansson: Many researchers become enamored of their own project. They want to achieve scientific results primarily, regardless of their commercial value. The most difficult task for a research chief is to stop a project.

SVENSKA DAGBLADET: The government recently presented a research proposal with a strong emphasis on basic research. What does that mean for you?

Sune Rosell: It is the best I have seen in many years. It states that researchers are not some strange characters who roam around in universities, but that society and industry actually need them.

Unlike the American industry, the Swedish pharmaceutical industry is a result of university research.

Elof Johansson: This is true both of Astra and Pharmacia. Swedish biological research has been far out in front ever since World War II when the government invested heavily in the Karolinska Institute. Since then, we have started the biomedical center in Uppsala and we are now starting a center in Huddinge.

Sune Rosell: The industry must be careful not to push too hard at the universities, however. I was around during the seventies when cooperation with industry and business was considered ugly. We survived that, thank God. Now we are quite welcome. The danger is that the industry could go in and try to control university research. That would be the death of us.

Elof Johansson: The university must conduct basic research and we must develop products. The problem is that they are now on an economic downturn, while we are on an upswing.

SVENSKA DAGBLADET: You are both investing in research abroad: Pharmacia in La Jolla, California, and Astra in Bangalore, India. Has Sweden become too small?

Elof Johansson: We are investing heavily in the American market and we have purchased a number of firms there. California and Boston are the two poles where resources for research are found. In addition, the right opportunity came along.

A number of companies are going bankrupt and many others have served their purpose. The availability of researchers has increased, wages have dropped by about 30 percent, and the value of the dollar has dropped. To me, this looks like a real bargain.

Sune Rosell: We see this as a better alternative than purchasing an American company. You are just purchasing problems and you do not know if you will be able to retain the key personnel.

A Unique Possibility

Sune Rosell: We were tipped off by a prominent Indian researcher in the United States. There are many skilled researchers there who want to move back home to India. This has given us a unique opportunity to recruit.

We will research tropical diseases in Bangalore. This involves millions of people. It is a problem that is difficult for us to understand in Sodertalje. In addition, the Indian market is enormously large and has a great purchasing power. India is not just poor. There is also a well-to-do class that is approximately as large as the population of West Germany.

SVENSKA DAGBLADET: You seem to be in close agreement on most questions. Are you not competitors?

Elof Johansson: No, we are not involved in the same areas and we do not compete with each other. What is more, we are each customers of the other.

Sune Rosell: We must remember that our companies are international. We sell most of our products abroad and our goal is not simply to be the biggest in Sweden.

Huddinge CBT Chief Interviewed

Stockholm SVENSKA DAGBLADET in Swedish 30 Mar 87 ekonomi special p IV

[Article by Inger Atterstam]

[Text] Research on gene technology based on hybrid DNA is now spreading like wildfire in Swedish medical research. The divisive debate and criticism of the seventies have ended in a kind of total capitulation and realization of this technology's inestimable value to research.

"Gene technology or biotechnology represents a totally new dimension in experimental medical and scientific research. We can obtain answers to important basic questions that we could never answer before. Even today, it is a condition for survival for researchers to learn and apply this new technology," Professor Jan-Ake Gustafsson said.

He is professor of medical nutrition at Huddinge Hospital and since 1985 he has been in charge of the Stockholm County Government and Karolinska Institute's 60 million kronor investment, the Center for Biotechnology (CBT), which is at Huddinge Hospital near Stockholm.

Developments have been extremely rapid and this means that changes must be made both in the research community and in the affected industry today--and even more in the future.

New Forms Of Work

"Gene technology research requires many new forms of work for researchers," Jan-Ake Gustafsson said. "The time has long since past when single individual researchers, more or less on their own, made research breakthroughs. Now, instead, it is a matter of cooperation not only within a research group, but also between several different research groups. That is a new challenge to the old academic tradition."

The effort in gene technology has also strongly influenced new attitudes toward the relationship between university and industry.

"The trend is toward closer cooperation between universities and companies," Jan-Ake Gustafsson said. "There are several reasons. This technology is expensive and requires much equipment. Consequently, enormous resources are needed and companies can help increase the traditional research appropriations.

Unheard-Of Possibilities

"It also opens up previously unheard-of possibilities for developing commercial products such as new generations of diagnostic tests, medicines, and vaccines. Obviously, this creates a point of contact between pure researchers and industry. In the future, the boundaries between these two categories will shift more and more and it will become more common for researchers to alternate between the two spheres of activity. Academic researchers will serve more often as consultants to companies or they will start their own companies once they have produced a product with commercial potential.

Prof Gustafsson believes that this trend can give impetus and vitality to both industry and the research community. The change is not without complications.

"This activity must be conducted with mutual respect," he said. "It is important to safeguard the freedom of research and to maintain high-quality and extensive basic research without demanding quick commercian results. We researchers must make clear that basic research is a prerequisite for further development."

Must Have Ice Water In Veins

"It is at least as important," he continued, "for the industry to understand that profits from gene technology research will take time. Those who invest in biotechnology research and activities today must have ice water in their veins. It takes time, for example, to develop new medicines and vaccines. Gene technology per se is quite simple, but in many cases it is still difficult to carry out in practice. The great individual breakthroughs generally take time, although certain medicines are already available. Thus, this is no activity for impatient people."

Two of the colleagues at CBT, Professors Jan-Ingmar Flock and Gunnar Norstedt, are more concerned.

"There is a clear risk that young researchers placed in this situation will choose to work on goal-oriented and commercial projects instead of basic research," they said. This is particularly true because of the incredibly low wages in Sweden that are paid to doctoral candidates and even to more experienced researchers from an international standpoint. This means that the possibility of higher income could affect the direction of research.

Uppsala and Umea were pioneers in gene technology research in medicine. Now, this technology has spread to all the medical schools in the country.

A Totally New Tool . . .

"Gene technology is actually a totally new tool for almost all types of research," Jan-Ake Gustafsson said. The basic principle is to use hybrid DNA technology, primarily, to study cell functions and to induce foreign genes into bacteria, yeasts, and mammal cells in order to manufacture large quantities of the proteins that the foreign genes produce.

Within the not to distant future, it will probably become possible to manipulate the genetic material itself.

Gene engineers have at their disposal a number of methods and much expensive equipment for producing various gene sequences in the genetic material of various cells, splitting them, rejoining them, and inserting them into the genetic material of bacteria, yeasts, and mammal cells.

Through various methods of analysis, the researchers can discover the structures of the various genes and how they control the production of proteins. Normal and defective genes and gene products can be compared.

Now, equipment is also available for constructing simple synthetic genes and certain proteins. They are used to trace and identify defective genes in patients with certain diseases.

. . . And A Totally New Institute

There are now about 40 researchers working on several different gene technology projects at CBT in Huddinge. These projects involve new vaccines, growth substances, and cancer genes. In April a totally new institute for molecular biology will open under the leadership of Professor Henrik Garoff of the large European Molecular Biology Laboratory (EMBL) in Heidelberg.

The center also represents another interesting aspect of this new technology. It was built with 60 million kronor in support from the Stockholm County Government as an investment in Stockholm's previously neglected southern suburbs. The goal is for CBT to be expanded by the addition of several companies so that it will help create a new future and vitality for the entire region.

Of course, these high hopes in biotechnology do not apply to Sodertorn alone--it is the foundation of a new era of industry for all of Sweden.

Companies' Products, Prospects

Stockholm SVENSKA DAGBLADET in Swedish 30 Mar 87 ekonomi special pp IV-V

[Article by Lennart Moberg]

[Text] On 8 January last year there was a big show at Operakallaren. Refaat El-Sayed and Pehr Gyllenhammar sat at the podium and explained how they thought the Swedish pharmaceutical industry should be restructured. Down among the audience sat an anonymous Erik Danielsson, chief of the Pharmacia concern.

Fermenta was to become the leading company in the field of pharmaceuticals and biotechnology. Pharmacia was to become a subsidiary.

It did not happen that way. Fermenta is now a badly bruised company with an uncertain future, to say the least. Refaat El-Sayed is completely out of the picture.

Instead, it is Erik Danielsson and Pharmacia that have taken charge. Last year Pharmacia purchased other companies for 5 billion kronor. Leo, LKB, and the American firm Intermedics were the most important purchases.

Now Pharmacia believes that its structure is complete. No new major purchases are planned during the next few years.

Pharmacia will now concentrate on developing the companies it already has.

Which Do What?

What, then, is the structure of the pharmaceutical and biotechnology industry? Which firms do what? Which companies are pharmaceutical and which are biotechnology firms?

In order to elucidate this, we have decided to divide the field up into three groups: instrumentation/technology, pharmaceutical, and biotechnology companies.

The boundaries are somewhat unclear. Some companies work in both pharmaceuticals and biotechnology, but we have arranged them according to their primary orientation.

Instrumentation/technology companies are somewhere between the other two groups. They manufacture instruments and substances that are then used in research and in the production of pharmaceuticals and biotechnology products.

This is the main orientation of Pharmacia, although it is also involved in more purely pharmaceutical and biotechnological production. This year,

total sales will amount to 6 or 7 billion and the company has just over 7,000 employees. This makes Pharmacia about the 35th largest company in the world.

Four Areas

Pharmacia has divided up its activities into four major areas: eye surgery, biotechnology, pharmaceuticals, and health care. Eye surgery is the most profitable, with the big profit generator healon. Healon is used in surgical eye procedures.

Last year Pharmacia made two major investments apart from its pure company purchases: a biotechnology research facility in La Jolla, California, and the joint venture Biolink.

Alfa-Laval owns 55 percent and Pharmacia 45 percent of Biolink. Its purpose is to sell finished production facilities for biotechnology research.

Here the two companies combine their knowledge and experience: Alfa-Laval in industry and Pharmacia in biotechnology.

Even before this, Alfa-Laval was interested in biotechnology. It is part of a consortium of Swedish interests that own shares in the American flagship of gene technology, Genentech. The others are Carnegie, Beijer, and the Wallenberg Foundation.

So far, biotechnology has been a small part of Alfa-Laval's activities, but it is certainly possible that this activity could increase. Gross sales for Biolink of 2 billion kronor are predicted for next year or even this year.

Former Favorite

Gambro of Lund is also among the instrumentation/technology firms. During the seventies it was one of the stock market's favorite companies and it grew extremely rapidly. Gambro's most important product has been its kidney dialysis machine. During the early eighties, however, the company suffered one setback after the other: unsuccessful stock emissions, damage suits, internal power struggles, and new owners.

Since Sonesson and new executive vice president Berthold Lindqvist took over, the company's activities have been reorganized and the firm is now recovering. Like the other companies, Gambro has a marked international orientation and 97 percent of its sales are abroad. Total sales are about 1.6 billion kronor.

The Largest

Of the pure pharmaceutical companies, Astra of Sodertalje is by far the largest. With just over 6,000 employees and gross sales of 5 billion, the company ranks near Pharmacia in the world ratings.

The blood pressure medicine Seloken has been a big seller for many years. Last year the company applied for the approval of two new medicines, one for high blood pressure and one for ulcers. Next year Astra hopes to present a new antidepressant.

Leo in Helsingborg merged with Pharmacia several months ago. It is no longer an independent company, but Leo will live on as a trade name.

Before the merger, Leo had about 1,200 employees and gross sales of almost 1 billion. The antismoking tablet Nicorette has been responsible for a large part of the profits, but Leo is now working on medicines for cancer, urine incontinence, and anxiety.

A Little Brother

Aco, which has belonged to Procordia since 1985, is something of a little brother in the pharmaceutical industry. Both sales and the number of employees are under the 400 figure.

Aco is more involved in developing known pharmaceuticals and substances than in producing totally new and unique medicines. The large pharmaceutical companies invest about 20 percent of their gross income in research and development. Aco is satisfied with half that figure.

Aco is almost completely oriented toward the Swedish market, with products such as magnecyl and skin lotions.

One of the most important biotechnology firms is state-owned KabiVitrum. It has had a number of dark years in the past. Many observers believe this was due to poor management and poor ownership.

But the new head of the concern, Jan Ekberg, has thoroughly reorganized the company and this year it anticipates a profit of about 300 million kronor, compared to a loss last year.

AIDS Scare

Along with the management problems, KabiVitrium suffered serious problems as a result of something that can practically happen only in this field. A blood clot medicine failed because of the AIDS scare in the United States.

Another setback came at about that same time. KabiVitrum had high hopes in a growth hormone. It has now discontinued work on this substance, since a competing medicine was found to have serious side effects.

KabiVitrum is now working with the American firm Genentech to develop a new growth hormone. The two companies are dividing up the development work and they will then divide up the markets. Genentech will take the United States and KabiVitrum will sell the product in Europe.

KabiVitrum is also a major owner of the gene technology research firm Kabigen. Kabigen has also had serious ownership problems in recent

years. KabiVitrum owns 45 percent and Fermenta owns 45 percent. The owners have been busy with their own problems, which has damaged Kabigen.

Kabigen is now involved in growth substances, medicines for hemophiliacs, and substances for use against blood clots. Skandigen is another research company. It is still too early to predict how well it will do. Its owners include financier Thomas Fischer. The company does not anticipate any large profits before the nineties.

Biocarb of Lund is another young research company that does not expect any major results until the nineties. The primary owner is Thomas Fischer's old partner Erik Penser. The company is involved in research on carbohydrates, but even now it is selling a product that is used to determine blood types.

Who Will Succeed?

Pharmacia and Astra are also investing in biotechnology research firms--but not in Sweden. Pharmacia is building up a company in La Jolla, California, and Astra is doing the same in Bangalore, India.

These are the most important companies in biotechnology and pharmaceuticals. There are other smaller companies. No one knows today which ones will succeed in the future.

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ITALIAN BIOTECHNOLOGY INDUSTRY PROJECTS DESCRIBED

Rome SCIENZA DUEMILA in Italian No 4, Apr 87 pp 53-54

[Text] Though with some delay, Italy's pharmaceutical industries are getting set to take part in the biotechnology race. In this connection, specific programs have been developed by Farmitalia-Carlo Erba (part of the Montedison group), Sclavo, Sorin Biomedica, Lepetit, Recordati, Serono, and Menarini. Other companies such as Sigma Tau and Biomedica Foscana also have launched major research programs.

In 3 or 4 years, a Farmitalia-Carlo Erba research center employing several hundred researchers--an estimated 1,800 by the late 1990's--will be established at Nerviano (Milan).

"This facility," says Professor Masue, who is in charge of research at Farmitalia-Carlo Erba, "will enable us to apply all cloning and DNA recombination techniques. Our technical personnel will include people specially trained in the fermentation of micro-organisms for large-scale reproduction. We will be working on a pilot project involving research on ways to improve production. In addition, we are going to study and try to develop monoclonal antibodies that are capable of attacking tumors without causing major toxic side-effects."

This is a highly complex area which is currently being tackled by numerous pharmaceutical industries and which--so far, at least--seems to point to one of the few really effective therapies against cancer.

The monoclonal antibodies that attack cancer cells have an extremely difficult task to perform. Cancer cells are human cells, and are very similar to the other healthy ones. This means that any monoclonal antibody "charged" with toxic substances must reach its target without affecting the other cells. A major breakthrough in this area of research was made in 1982 by Henry Harris of Oxford University, with the publication of his research on the Ca antigen. If these results are substantiated by further evidence, the production of monoclonal antibodies capable of fighting the Ca antigen may prove to be of great importance for the diagnosis and treatment of cancer.

The research being done today throughout the world into cancer-fighting drugs has suffered a setback for a number of complex reasons, primarily the lack of

in-depth knowledge of the various types of cancer. This has led the pharmaceutical industry to shift research to new therapies. In this case. the monoclonal anitbodies would be used as a kind of remote-controlled explosive missile. Researchers Caird Edwards and Philip Thorpe of the Chester Beatty Institute in London, have called this the "retiarius" technique, a term based on the name of the gladiators of ancient Rome who fought with only nets and tridents for weapons.

Farmitalia-Carlo Erba researchers are trying to develop a way of "charging" the monoclonal antibodies with anthracycline [Antraciclina]. However, vegetable-based toxic substances exist that are capable of killing the cancer cells.

"Another very important program," adds Prof Masue,"concerns cardiovascular diseases. We are trying to develop an enzyme (urokinase) capable of dissolving blood clots and, therefore, of preventing heart attacks or strokes, as well as many other diseases." Research on enzymes capable of clearing the veins and other blood vessels of occlusions or clots is being done in many countries throughout the world. This race offers enormous prospective markets, since it is well-known that the population of the West is tending to become older, and that these types of cardiovascular disorders normally affect elderly people.

"Atfirstglance, it might seem that industries both in Italy and in other countries are working on the same products," remarks Prof Celestino Spalla, a lecturer on industrial microbiology and a senior member of the Farmitalia-Carlo Erba research team, "but it is not so. There is a lot of discussion about those products such as interferon--the hormone responsible for growth--and urokinase which are fundamental for all the research being done. However, both the general public and the press pay greater attention to these products because of their social importance. In the world today researchers are working on several hundred new drugs."

However, there is no doubt that the first major applications of biotechnologies will affect the agricultural sector rather than health. The reason is that agriculture is a sector which offers industry considerable rewards in terms of both markets and profitability. Today, research is being carried out on an extremely large number of bacteria, each with its own specific characteristics, which are expected to replace at least partially the chemical fertilizers and pesticides that are causing so much damage to man's health.

"Biotechnologies have a huge potential," notes Prof Arrigoni Marcelli, research director at Sigma Tau. "Today, only a limited number of techniques are available; we are working on others, and God only knows how many more are still to be discovered. If we are to do this, we must be prepared to develop high-risk programs--programs designed to provide us with the products we will use not in 2 or 3 years, but in the year 2000."

The history of "biotechnology is still young," Arrigoni Martelli adds. "We are able to produce human insulin, and we are experimenting with sophisticated techniques through which genetic information can be transferred from an animal

to a vegetable." This was done by implanting a gene of a firefly in a tobacco leaf. This is only the beginning. Researchers have just started testing hybridome [Ibridoma] for the production of monoclonal antibodies.

"Today the level of basic knowledge is more or less the same in all countries. It goes without saying that the industrial and technological structures of the United States are much bigger than Italy's and that the Americans have a tradition of commitment to 'high-risk' investments.

"In Italy, with a few exceptions, there are no industrial initiatives specifically directed toward the field of biotechnologies. There are only a few industries, such as Sclavo, which specializes in vaccines and is concentrating on biotechnologies in order to upgrade and expand its product range."

Sigma-Tau has started to work on biotechnologies on a very small scale. The company is cooperating with many European and American universities on specific projects, which are soon to go into production.

"Sigma-Tau has been taking an active interest in biotechnologies for quite some time, an example of this being the industrial applications of Carnitine," says Arrigoni Martelli. "We will have independent laboratories in 2 years --the time needed to construct them."

The IRFI [expansion unknown] research center set up at Anagni by Biomedica Foscana is to become operational by the end of this year. "Our center," observes Dr Scuri, director of research, "will be in charge of all pharmaco-biological research, ranging from toxicology to the screening of new molecules, and from organic synthesis to the various areas of analytical chemistry. We also will have controlled-temperature rooms in which to conduct tests under optimal temperature conditions--a basic requirement in all countries. In addition, we will have sophisticated equipment for carrying out in-depth studies in the various fields. Biotechnological research is to be one of the main activities of the center. Needless to say, we will have to be very careful in the beginning, using the experience we have acquired. Ours is to be a gradual approach to biotechnologies. This means that we must consider the various forms of cooperation that are necessary in this area of research. Work in the biotechnology laboratory will be carried out only by our own technical personnel and, for more complex problems, with the help of outside technical personnel. We want this research to originate from within, from our company, in order to ensure that it is consistent with our development plans. About 50 researchers will be involved in biotechnologies." According to Dr Scuri, no entirely new biotechnology research projects are currently being developed, primarily because of the fact that Italy entered the field somewhat later than other countries. In addition, Italy's public structures are not doing enough pure research in this sector. As Dr Scuri says, "Fidia, for example, is following up Levi Montalcini's discovery, this possible form of synthesis. This is a case in which pure and applied research have been combined successfully, since all applied--industrial--research must start from some kind of basic datum."

In Dr Scuri's view, over the next few years biotechnology products will become essential items for any pharmaceutical industry that wishes to be competitive, up-to-date, and profitable, since, if the forecasts prove correct, these products will replace traditional drugs in the very near future. In the pharmaceutical field, biotechnologies are a must for any company wishing to improve its drugs and reduce their level of toxicity while at the same time increasing their effectiveness.

8628
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FINNISH 3D SYSTEM MEASURES AIRCRAFT, HOT ITEMS, SUBMERSIBLES

Helsinki HELSINGIN SANOMAT in Finnish 12 Mar 87 p 29

[Article: "New Measuring System from VTT for Quality Control"]

[Text] World's first three dimensional video measurement system, Mapvision, which can be used especially for quality control in automated factory settings has been developed at the state's technical research center VTT. The first applications were developed for measurement tasks in aircraft and ship building.

VTT informs us that Finnish industry is not interested in Mapvision, but one of the most important systems manufacturers, the West German Ernst Leitz company is interested. It is beginning world-wide marketing of Mapvision. The manufacture and the development of Mapvision will still be kept in Finland. After further development and application studies the device will probably be ready for industrial use in a year or two.

If no existing enterprise will take Mapvision as its own VTT intends to give it to some newly established venture.

The idea of realtime videomeasurement now in use is based on a VTT invention for which two domestic patents have been sought. Mapvision was completed already in May last year in a venture funded by Sitra and enterprises. Its first systems were sent to West Germany and Switzerland at the beginning of this year.

Mapvision is a measurement device which is able, with its attached 2-4 videocameras, to sense, localize and measure changes occuring in the environment in three dimensions. It can be used to check finished products or examine them already during the manufacturing phase. This, according to the developers of the device Henrik Haggren and Esa Leikas, is a great advantage as inadequate measurement technology is causing factory automation ever increasing expenses. Another advantage of the device is its speed and accuracy. It records 40 observation points in a minute and has a margin of error of less than a millimeter during a five meter scan.

The device has been used in aircraft manufacture for checking symmetry measurements. By comparing symmetry distances, possible distortions of shape in use, caused, for example by "hard landings," can be detected. In shipbuilding experiements have revealed the possibilities of Mapvision at least in the measurement of steel hull form and dimensions during different phases of construction.

The digital measurement of hot items is among the newest applications. In the near future the procedure will also be tested with underwater measurement tasks by repair robots. By using high speed cameras it will be possible to measure moving targets and rapid changes in shape.

Unit Price 400,000 Markkas

Mapvision can be easily attached to the computer and automation devices of factories since the device is based primarily on ready-made and available video equipment and processing technology. Its unit price is estimated at 400,000 markkas.

Mapvision will be exhibited publicly for the first time at the international meteorology Quality conference at Chicago in April and after that in June at the Detroit Vision 87 Exposition and Conference in which VTT is also taking part.

12989
CSO: 3698/378

SIEMENS EXPANDS COMPUTER-INTEGRATED MANUFACTURING PRODUCTS

Paris INDUSTRIES ET TECHNIQUES in French 1 May 87 pp 79-82

[Article by special correspondent Frank Barnu: "CIM With Pragmatism"]

[Text] Almost with discretion, Siemens has managed to acquire all the links needed for workshop automation; it is thus one of the very first CIM poles in the world. Its success is based on its knowhow of electronic automation systems, from electric motors to computers. Today, the company is displaying its CIM ambitions, in particular by tackling CAD.

Siemens, therefore, has become a world leader in automation, with an impressive product line. Products which start very close to the process, with electric motors for machine-tools and robots; numerical controls (the German company can boast to be the leading European manufacturer and one of the world leaders); programmable controllers (here again the leading European manufacturer); computers, from personal computers to minicomputers, as well as work stations. Add to these all other ingredients such as local area networks, visual systems, data automation systems, etc., and of course computer-aided production management and CAD. Plus continuous-process control systems.

The secret of its success may be quite simple. For a long time, Siemens has been engaged, and has chosen to remain in a trade that it knows well: that of electric systems first, then electronic automation systems. Starting with the simplest systems, electric motors, the company has built up its knowhow for years, block by block, as needed: numerical controls, then programmable controllers, computers, etc. In other words, the CIM activity evolved "naturally," through internal growth, as new workshop requirements emerged. Quite the opposite of an artificially constructed "pole." Especially as Siemens relies on its own industrial plant which it must modernize itself. We could not enumerate all the CIM projects of the group. At Erlangen (NC manufacture), DM45 million are being invested to computerize production; the goal is to reduce from 90 days to 3 weeks the time each numerical control spends in the workshop. At Amberg (programmable controllers manufacture), DM 35 million are being spent on a flexible electronic-board production line which includes many wire-guided carts and robots. At Wurstburg, they have flexible assembly lines for electric motors, etc.

The Automation Division and its Organisation by Product Lines

Department	Product Line
E 8-1	- Programmable controllers (SIMATIC) - Process-control systems (TELEPERM)
E 8-2	Numerical controls and motors for NC machine-tools (SINUMERIC)
E 8-3	Numerical controls and motors for robots (SIROTEC)
E 8-4	Data-processing systems and standard applications: - FMS (flexible workshops) - work stations: - Apd 60 - PC - Centralized command and control
E 8-5	Data-processing equipment and systems (SICOMP)
E 8-6	- CAD/CAE - Application software
E 8-7	- Production process control system - Turnkey applications - Local area networks
E 8-8	Training and services

This pragmatic approach has one natural consequence. The company does not wish to get away from the field on which its success is based: "As far as production automation is concerned, we shall continue to focus on the production of electronic equipment," people at Siemens say. "A market segment which is bound at the top by minicomputers and at the bottom by numerical controls. In particular, getting into mechanics via machine-tools is out of the question, as we do not wish to compete in this field with companies which purchase our electronic automation equipment. A typical example of this division of labor is that no robots are to be found at Siemens. They are manufactured by it Manutech subsidiary.

Apart from that, the strategy of the group is changing as required by integration. First, in the past 3 years Siemens has regrouped all its CIM activities in a single entity, the E8 Division of the Energy and Automation Group, "in order to take maximum advantage of synergism among the various systems," we were told by Siegfried Waller. In July 1987, the E8 Division and its 1200 people were moved to Morenbrunn, in a stately building which also houses the group's centralized R&D on automation. Some 500 people work on this R&D, in particular on components, basic software and network problems (here, Siemens has a ringside seat to watch the MAP and CNMA projects). An

impressive budget is devoted to this activity: 15 percent of the division's sales, i.e. close to DM400 million. It is nice to belong to a group which earns money!

Another development: Siemens, which may be said to be the champion of production automation and possesses expertise in all key links in this field, must enrich its catalog to offer a true CIM solution. In particular with respect to engineering departments, and therefore CAD, where its offer is still limited. Its desire to enter this new market is warranted by the predominant role played by CAD in computer-integrated manufacturing and is somehow at odds with the policy followed until now. It is a new trade for Siemens which is becoming increasingly active on a market where it finds many solidly entrenched competitors. This policy could also mark the end of its internal growth. Already, the company has had to sign agreements with a manufacturer, Apollo, to get adequate work stations, and Siegfried Waller acknowledges that he does "not exclude internal growth through corporate acquisitions." Why not in the CAD sector?

At any rate, this shows that the idea of a "CIM pole", or a large integrated group possessing expertise in all of the CIM basic components, is not dead. In this case, Siemens' decisive advantage is that it can rely on a strong base of workshop-automation products. Products which have one major advantage: meeting an immediate need, they sell well! Whether electric motors, numerical controls or programmable controllers, there is no need to wait for the "factory of the future" to acquire them. That is more than those who counted on the production of flexible workshops can say. Add to this that Siemens has the benefit of the most favorable environment: the German machine-tool industry is among the most dynamic. In this respect, too, not everyone is that well off.

The notion of pole is doing so well that, in the future, Siemens will have to count with a native competitor, the Daimler-Benz group which recently announced its decision to become one of the world's leaders in this sector. With AEG (programmable controllers, Modcomp real-time computers), the group already possesses certain "building blocks," a considerable industrial potential (Mercedes-Benz, MTU, Dornier, etc.) and quite a lot of money (over DM1 billion) to be spent on building up its overall CIM capabilities. The group, especially Mercedes, is a very large customer of Siemens for industrial data processing equipment. This does not bother Siegfried Waller too much, and he stated confidently that he does not expect much change on the German market in the next 5 years.

9294
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BRIEFS

FINNISH DEALS WITH USSR, SOUTH KOREA- -Rauma-Repola has made a significant winch deal with the Soviet foreign trade organization Sudoimport. Primarily during this year Rauma-Repola will ship 33 winches to the USSR. The total value of the deal is about 38 million markkas, and it will secure full employment for the Rauma-Repola deck-machine factory for this year. The most important part of the deal is the 20 ton trawler winches. The deck-machine factory has also conluded its first agreement for the cooperative production of deck machines in South Korea. In addition to blueprints, Rauma-Repola will provide hydraulic equipment and spare parts, but the machines themselves will be produced in a local machine shop in South Korea under Rauma-Repola's supervision. [Text] [Helsinki HELSINGIN SANOMAT in Finnish 26 Mar 87 p 29] 12989

CSO: 3698/378

FINLAND: 100 MILLION MARKKAS TO DEVELOP MICROELECTRONICS

Helsinki HELSINGIN SANOMAT in Finnish 14 Mar 87 p 45

[Article: "Microelectronics to be Developed with 100 Million"]

[Text] Tekes, the Center for the Development of Technology has initiated a development program in microelectronics. The costs of a four year program will be about 100 milllion markkas.

The program will be implemented by the cooperative efforts of Tekes, high schools, research institutes and industry. So far 16 enterprises have joined the effort.

"We are still accepting applications and believe that the number will grow," says the developer of the program, assistant director of Tekes Kari Tilli.

Tekes will cover 60 percent of the expenses and industry 20 percent. The program is expected to use up 200 man years of work.

Microelectronics is basic technology which has a central role in the development of office communication systems, industrial automation and consumer goods. During the past decade microelectronics has invaded, among others, stoves, refrigerators, cameras and automobiles.

"Microelectronics is key technology, the development of which is important for the entire society," says Tilli.

General Knowledge as a Goal

The development program belongs among Tekes' public applied research programs, which cover about one third of all Tekes' enterprises.

"The goal of the program is not to develop new products, but to raise the general level of knowledge, which in turn will give rise to practical applications of technology," says Juhani Kuusi, chief director of Tekes.

Tekes has over ten national technology programs, which aim at the furthering of international competitiveness by raising the level of knowledge and technology. The microelectronics development program continues the semiconductor technology program which ended in February.

The projects belonging to the program include design and training in printed circuits, microchip technology plus photonics and semiconductors.

According to Tekes the level of microelectronics training and research in Finland is in serious danger of being left behind the level of international development. The objectives at present are to bring to Finland, among others, microcircuit design devices, programs and information processing know-how.

"The program can not be characterized as notable. We are going to reach the bare minimal level of publicly available research," opined development director Timo Salo from Nokia's Microna company, which is one of the enterprises participating in the program.

12989
CSO: 3698/378

CANADA SEEKS PARTICIPATION IN EUREKA

Paris AFP SCIENCES in French 6 May 87 pp 6-7

[Article: "Canadian Mission Sent to Europe to Participate in 'Eureka'"]

[Text] Rome--The Canadian minister of regional industrial expansion, Mr Michel Cote, left Italy for the FRG on 5 May, after a 2-day visit devoted to promoting the participation of Canadian firms to the European Eureka research and development program.

Mr Cote is leading a delegation of some 15 businessmen representing advanced sectors of the Canadian industry, to explore the possibility of agreements with European partners working with Eureka, in the context of the aid granted by the Ottawa government.

This aid--amounting to Canadian $20 million over 18 months--is designed to cover up to 50 percent of the research and development expenditures of Canadian companies participating in European high-technology projects. Indirectly, it thus encourages European investments in Canada--which is a natural access road to the North American market.

Italy, Mr Cote stated, is--after France--the second European country as far as credits granted to Eureka are concerned, and its support already amounts to $1 billion (for a total of $3.5 billion at international level). Canada therefore acknowledges the "major part" played by this country, the minister said.

Among the agreements which, it is hoped, will materialize soon, the minister mentioned cooperation between Marconi Canada and Marconi Italy; between Quadra Logic (biotechnologies) of Vancouver, PROMIS (microelectronics) of Toronto and Lavalin (advanced materials) of Ottawa, on the one hand, and the Fiat group on the other hand.

After Rome and Milan in Italy, the mission should go to Munich, Garmisch and Bonn, in the FRG, on 6-7 May, and to Amsterdam, Netherlands, on 8 May; Mr Cote will have conversations with the competent ministers, and the businessmen will look for concrete results in their meetings with potential partners such as Volkswagen, Philips or Shell.

Considering, Mr Cote added, that one dollar invested in research and development results in ten dollars' worth of economic activity, the Canadian project of support to Eureka should bring in results worth about $0.5 billion.

The first such mission, which came to France in November 1986, even brought trade results that had nothing to do whatsoever with the Eureka program.

Finally, Mr Cote did not fail to point out that these are the fruits of the policy of opening up of Mr Mulroney's conservative government. In 1986, he recalled, foreign investments in Canada amounted to $7 billion, compared with $4.2 billion in 1985.

9294 CSO: 3698/463

FRG-USSR COLLABORATION IN NUCLEAR SAFETY, REACTOR CONSTRUCTION

Construction of HTR-100 Reactor

Paris AFP SCIENCES in French 9 Apr 87 pp 55-56

[Unattributed Article: "German-Soviet Cooperation Agreement on the Construction of an HTR Reactor in the USSR"]

[Text] Essen--On 3 April, the West German consortium Innotec Energie Technik of Essen announced the signing in Moscow of a cooperation agreement to develop, construct and use a very high temperature (HTR) nuclear reactor in the USSR. The agreement relates to a 100 megawatt reactor baptized HTR-100, several elements of which will be manufactured in the USSR. Negotiations between Innotec and the USSR began last summer, shortly after the Chernobyl catastrophe.

Innotec Energie Technik indicated that the contracts settling the issues of technology transfers, supplies and financing will be ready to be signed within 18 months. According to West German industrial experts, the cost of the project will be on the order of DM1 billion.

The consortium includes the nuclear power station builders Brown Boveri & Company (BBC), the German branch of the Swiss BBC group, the Hochtemperatur Reaktor Bau (HRB) of Dortmund, as well as the engineering and mechanical construction companies Deutsche Babcock and Mannesmann Anlagenbau and the public works company Strabag. The objective set by this consortium is to standardize the manufacturing of the small HTR reactor, developed by BBC and HRB for export.

A 300 megawatt HTR reactor was built in the FRG, at Hamm Untrop, in the Ruhr. It cost DM4 billion and has been in operation since September 1985. Its construction, which was started in 1971, cost six times more than the initial estimate. It is the most significant reactor of its kind in the world. Its completion, largely supported by public aid, has placed the RFG among the leading countries which have mastered that technique.

In this type of reactor the fuel consists of uranium and thorium balls wrapped in graphite. Its operating temperature is 950 degrees Centigrade. It can be

used to manufacture steam and electric current, but also for urban heating, or to produce heat for industrial use in the oil, mining, and chemical industries, etc.

Innotec explained that this agreement with the USSR was the result of the desire of the Soviet number one man, Mikhail Gorbachev, to develop a small power HRT reactor in cooperation with Western technicians. Mr Gorbachev expressed that desire in June 1986 in Budapest.

The consortium, led by Innotec, is also trying to sell its power stations to China. For several months now, the other major builder of West German nuclear power stations, Kraftwerk Union (KWU), a subsidiary of Siemens, has been interested in the market for modernization of the fine control and control systems of the Soviet power stations.

Nuclear Safety Accord Signed

Paris AFP SCIENCES in French 9 Apr 87 p 56

[Unattributed Article: "FRG/USSR: Signature of Agreement on Nuclear Safety Near"]

[Excerpts] Bonn--It was learned from official sources in Bonn that the West German minister for research and technology, Mr Heinz Riesenhuber, will visit the USSR from 21 to 23 April to sign a technical cooperation agreement on the safety of civilian nuclear installations.

This agreement stems from a basic agreement concluded between the FRG and the USSR in July 1986. The document which Mr Riesenhuber will sign in Moscow on 22 April organizes the exchange of information between the two countries in matters of security of nuclear reactors, as well as the rapid exchange of information in case of an accident in one of those installations.

8463
CSO: 3698/433

MAX-PLANCK PRESIDENT ON INSTITUTE'S RESEARCH, GOALS, FUNDING

Duesseldorf HANDELSBLATT 31 Mar 87 p 15

[Article by Werner Osel: "Max-Planck Society: Basic Research Recognized the World Over Also Beckons Discriminating Scientists From United States. Venerable Institution Always Open to New Questions"]

[Text] Munich, 30 Mar--The ecological changes taking place in our environment, the fundamentals of computer science and up-to-date research with respect to Japan are some of the topics currently under discussion as new areas of interest, says Dr Heinz A. Staab, president of the Max-Planck Society (MPG), in an interview with HANDELSBLATT. He thus demonstrates that the venerable institution for basic research, founded in Berlin in 1911 as the Kaiser-Wilhelm Society, remains as always dynamic and open to new questions.

Staab: "With respect to the scientific arena within Germany we have the big advantage of being able to make choices, set priorities and take on current problems, while the universities naturally have an obligation to prepare and teach everything as uniformly as possible. We can take on areas which are not yet established and which require cooperation in several specialized fields. We intend to do so with a special emphasis on quality. This means that we need very good scientists, and they can be obtained if very good working conditions can be offered."

The registered Max-Planck Society for the Promotion of Science, with headquarters in Munich, is the sponsoring agency for currently about 60 institutes, research facilities and short-term clinical research groups and working groups of very different sizes, structures and areas of responsibility which are not affiliated with universities. Including the Institute for Plasma Physics in Garching, which as one of the Max-Planck Institutes is responsible for typical areas involved in a large-scale research facility (in particular the development of nuclear fusion technology), the MPG employs over 8000 people, about 2200 of them scientists. The Institute has a budget of around DM 1 billion, financed by the federal government and the Laender at 50 percent each, with a small portion coming from member contributions, foundation funds and project funds.

Broad Range of Topics

The number of topics being dealt with is extensive and broad in scope, encompassing the natural sciences as well as the arts, and emphasizing the natural sciences and medicine. "We are very happy that we have lawyers and scholars in our circle because in the modern natural sciences and in medicine there are problems--in genetic engineering, for example--which cannot be handled by technology alone," says Staab.

What are the areas taken on by the MPG? What is rejected and what leads to the founding of a new institute or research group? Staab: "In fundamental research, planning is certainly much more complex than in development or applications where not only clear objectives, but also the basic methodology is frequently already known. We must conduct experiments in which it is simply not yet clear what the outcome will be."

Ultimately, fundamental research does also produce very solid results time and time again. Staab reminds us of Roentgen who researched emitted rays and discovered x-ray technology. He refers to Alexander Fleming whom we have to thank for penicillin. Otto Hahn was able to split the atom but in no way had he sought an inexpensive way to generate energy. Immunological research may one day produce a cure for the immune deficiency of AIDS. The list goes on and on. All of these may be considered a "justification" for fundamental research but are scarcely suitable as planning or selection criteria or as orientation aids in the selection of subjects.

"In fundamental research, open questions are dealt with for which answers must first be sought." In other words, the Max-Planck Society must be guided more by scientific curiosity than by planned results. This allows it to plant its seeds in many different fields and from this humus comes the growth of many beneficial applications. Such developments are of course then no longer the responsibility of the MPG, because the MPG has fulfilled its obligation as soon as answers to basic questions are found.

The area of activity is assigned and possibly an entirely new institute is formed. For Staab that is not just an accepted part of his responsibility but rather a necessary strategy for maintaining the dynamism of the MPG--because "science is a dynamic process to which organizational structures in the sciences must adapt over and over again. To refuse to accept change is, for a scientific organization, the first step down the path toward irrelevancy," emphasized Staab.

For more than 15 years, however, the dynamism of the MPG has been limited by a lack of resources. More fundamental research is demanded throughout the land, and yet the flow of financial resources is severely limited. "We are really dependent on public funding as our primary source of financing, but for years the allocated funds have been increasing at a less than proportional rate," says Staab. The problem may lie within the system. The federal government provides only an amount equal to that provided by the 11 Laender. Therefore, when one of the 12 contributors is short of cash, the contributions of the others are also decreased. And the MPG comes up short. Since the cost of employing qualified personnel increases regularly, cuts must be made in

investments. However, this is only feasible within certain limits if the work is to continue and if good scientists are to continue to be attracted.

Competence An Essential Requirement

More important even than adequate financing--without which nothing would be possible, of course--is the quality and competence of the scientists. "Even if we can conceive of an interesting research project, we would not go after it unless we were first able to appeal to a suitable person to head it." The fine international reputation of the MPG, which has been maintained steadily for many years, makes it possible for it to obtain scientists from all over the world.

At present Staab is negotiating with several scientists in the United States to whom the work at the Max Planck Society seems very appealing, in part due to their scientific viewpoint but also due to the flexibility of the administration which views itself as a department for assistance and service to the scientists, and not least of all due to the basic tenet that the researchers may immediately publish all of their results.

Although the MPG exhibits clear differences with respect to other scientific institutions in terms of its tasks, its organization and its perception of itself, there is nevertheless close and lasting cooperation with the universities in particular. Over 90 percent of the institutes' directors are engaged at the same time as professors or honorary professors at a university. At present there are always approximately 1000 doctoral candidates working within the various Max Planck Institutes. Close contacts with foreign research centers have also been established. There are regularly about 1200 to 1400 young scientists from other countries working at the MPG. "I believe the fact that for several years the largest national group has come from the United States says something about the reputation of the MPG; Japan now has the second largest group. We know that the scientists in these countries are particularly demanding. When they continue to select us, we consider it as a kind of distinction."

As an internationally recognized institution for fundamental research, the talk of a European technology gap and of "Euro-sclerosis" has never applied to the MPG. Although fundamental research can result in marketable products, that is not its primary purpose. But without fundamental research and the knowledge it provides there will be no development of new technologies and new medical procedures. "We believe that our contribution outweighs our percentage of research funding," says Staab. In fact, the approximately DM 1 billion in the MPG budget amounts to just 2 percent of the over DM 52 billion in annual research funding in the FRG.

12552
CSO: 3698/384

IMPACT OF FRANCE'S RESEARCH TAX CREDIT BY SECTOR IN 1985

Paris INDUSTRIE ET TECHNIQUES in French 1 May 87 p 35

[Article by Gilbert Pointout: "Research Tax Credit: Fr1 Billion for 2,700 Companies"]

[Text] Over Fr1 billion (Fr1.056 billion) to more than 2,700 companies (2,719), such are the results of the research tax credit (CIR) for expenditures made in 1985. A definite success, therefore, for this measure instituted by the 1983 finance law which, as is known, allows companies to deduct from their taxes 50 percent of the increase in research investment from one year to the next.

It benefits primarily small companies. Indeed, companies with sales below Fr50 million received over 15 percent of the total research tax credit, although their research expenditures represented only 4 percent of the total. Conversely, large companies (sales over Fr1 billion), whose 1985 research investments represented about two-thirds of the French total, received only 30 percent of the research tax credit.

We should also note that, through the research tax credit, the State assumes over 15 percent of the research expenditures of small companies, and only 2 percent of those of larger companies. All activities together, the tax credit represents 3.7 percent of all expenditures. An overall figure that should be qualified by sectors.

The impact of the research tax credit is particularly noticeable in the textile industry (where the research tax credit/expenditures ratio amounts to 17 percent), construction and public works (9 percent) and the agrifood industry (7.4 percent).

It is also important, but in another respect, in the aeronautical and data processing/office automation sectors, since the average research tax credit per company in these sectors amounted respectively to Fr1.2 and Fr0.75 million, i.e. much more than the national average (Fr0.39 million per company).

Conversely, however, these sectors made relatively little use of the research tax credit; for instance, the credit does not account for much more than 0.8 percent of the research expenditures of the aeronautical sector.

The sectors which are the primary beneficiaries of the research tax credit are the chemical/parachemical/pharmaceutical sector (over 20 percent of the total), the electronics sector (14 percent), and the mechanics sector (14 percent). About the same leading pack as last year. But the figures are hardly comparable: the increase in the tax credit rate (from 25 to 50 percent) and in the credit ceiling (from Fr3 million to Fr5 million) make it impossible to compare the Fr1.056 billion of the 1985 research credit and the Fr477 million which, in 1984, benefited 2,323 companies.

The Lion's Share to the Chemical Sector

Sector	Research Tax Credit (Millions of Francs)	Number of Beneficiary Companies
Chemical, Parachemical Pharmaceutical	229	347
Electronics	147	236
Mechanics	146	500
Electrical Equipment	64	141
Automobile	44	64
Data Processing and Office Automation	43	57
Aeronautical	40	32
Agrifood	39	169
Iron and Steel, Metallurgy	33	70
Construction and Public Works	29	110
Rubber and Plastics	19	110
Energy	16	20
Others	207	615
Total	1,056	

9294
CSO: 3698/463

ITALIAN 'FINALIZED' ADVANCED TECHNOLOGY PROJECTS OUTLINED

Rome PROGETTI FINALIZZATI GENERAZIONE 1986 in Italian pp 3-7, 14-18, 26-29, 30-34, 40-45, 46-54

[Excerpts of Italian National Research Council (CNR) booklet providing synopses of "CNR Finalized Projects" for 1987-1991 in telecommunications, electro-optical technologies, new materials, superconducting technologies, data processing systems, and biotechnologies; date of issue not given]

[Excerpts] Finalized Project: Telecommunications

Feasibility Study

Summary

1.1. To provide the domestic manufacturing and service industry with new and sophisticated technologies that will allow Italy to participate in international research programs, such as RACE, at a technological level comparable with that of the major industrialized European countries. Participation in this finalized project and in RACE may make it possible for Italy to compete in the broadband communications sector at an international level;

1.2 To involve researchers from various cultural backgrounds and disciplines in wide-ranging programs;

1.3 To promote the training of highly skilled personnel in highly innovative environments.

2. Breakdown of the project into subprojects

1. Structure of broadband communication networks
2. Broadband communications technologies
3. Technologies for terminals
4. Broadband access and interconnection techniques
5. Experimental production.

3. Project proposals

1. Structure of Broadband Communication Networks

	Priority	
1.1	I	Definition of the functional characteristics of terminals
1.2	I	Definition of user channel capacities and of the corresponding need to reduce redundance
1.3	I	Definition of user access
1.4	I	Role of mobile radio systems
1.5	I	Switching and signaling requirements at a local and geographic level
1.6	I	Integration of terrestial resources with space segments
1.7	I	Definition of transmission requirements at a geographic level
1.8	I	Network management

2. Broadband communication technologies

2.1	III	Design techniques for high-speed and/or high-frequency silicon integrated circuits
2.2	II	Passive optoelectronic components
2.3	II	Production technologies for low-cost optoelectronic components
2.4	III	Connection technologies for high-capacity (over 2 Gbit/second) fiber junctions
2.5	III	Technologies for on-board and ground connections for space links

3. Technologies for terminals

3.1	I	Numeric processing of audio, image, and video signals
3.2	III	Image sensors
3.3	III	Flat-screen display devices

4. Broadband access and interconnection techniques

4.1	II	User access techniques
4.2	II	Broadband switching techniques
4.3	II	Broadband on-board satellite processing techniques

5. Experimental production

5.1	I	Multiservice terminals
5.2	I	Ground station for space segment
5.3	I	CNR integrated network.

4. Projected operating units (average number)

Subprojects	Financed by the project	Financed by others	Total
1.	2	1	3
2.	9	5	14
3.	7	4	11
4.	9	5	14

5.	8	5	13
Total	35	20	55

5. Expected human resources requirement (man years)

Subprojects	Management years					Total		
	I	II	III	IV	V	public	private	overall
1.	20	10	5			35	42	77
2.	24	45	59	41	11	180	204	384
3.	30	35	45	40		150	178	328
4.	40	45	50	55		190	124	314
5.	17	18	20	25	90	170	202	372
Total	131	153	179	161	101	725	750	1475

6. Breakdown of human resources

	Public	Private	Overall
Man years/Operating unit	20.7	37.5	26.8
Researchers/Operating unit (Man years/ Operating unit/Duration)	4.1	7.5	5.3

7. Projected overall financing (in billions of lire) (at a 5 percent average annual inflation rate)

Subprojects	Management years					Financing	
	I	II	III	IV	V	CNR	Other
1.	1.7	0.7	0.6			3.0	21
2.	2.0	3.4	5.9	3.6	1.0	15.9	15
3.	2.1	2.8	5.0	3.4		13.3	16
4.	2.7	4.0	5.2	4.7		16.6	10
5.	3.3	3.1	4.0	4.5	17.5	32.4	13
Management	0.2	0.2	0.2	0.2	0.2	1.0	
Total	12.0	14.2	20.9	16.4	18.7	82.2	75

8. Breakdown of financial resources

	1987	Total
Millions of lire/Operating unit	218.2	1494.6
Millions of lire/Researcher	41.2	279.0

9. Specialists and personnel training

Charged to Project		From Other Sources
Art. 36	Scholarship/year	Scholarship or training and work contract
4	30	20

Finalized Project: Electro-optical Technologies

Feasibility Study

Summary

1. General objectives of the project

The general objectives of this project are similar to those of the other projects. Specifically, the project aims to:
--enable Italian industry to obtain new and sophisticated technologies;
--stimulate cooperation between researchers from various cultural backgrounds and disciplines, particularly between researchers in government bodies and researchers at industrial research laboratories;
--promote the training of highly qualified new personnel;
--spread an electro-optics "culture" in industry.

The specific objective that distinguishes this project is the development of highly innovative system prototypes for a vast range of applications. In certain cases the proposed developments are considered within the framework of the entire production process in order to produce modular and standard components. At all times, market requirements determine the selection and finalization of the systems under consideration.

2. Breakdown of the project into subprojects

1. Systems for manufacturing and industrial diagnostics
2. Computer, environmental, and defense systems
3. Active electro-optical components
4. Passive electro-optical components
5. Interaction between radiation and biological structures; biomedical applications systems (temporarily being handled by the project management)

3. Project proposals

1. Systems For Manufacturing And Industrial Diagnostics

Priority

1.1 I Manufacturing systems for the electronics industry
1.2 I Laser-robot systems for mechanical cutting processes, three-dimensional welding, and thermic treatment using power up to 5 kW.
1.3 I Multiprocess and multipiece flexible welding systems, thermic treatment and coating using power over 5 kW.
1.4 I Flexible and programmable devices for moving and adjusting laser beams
1.5 I Devices for beam and process diagnostics
1.6 II Electro-optical systems for measuring surface quality, size, position, and dynamic parameters

2. Computer, environment, and defense systems

	Priority	
2.1	I	Coherent reception systems for the analysis of obstacles and of the interposed object
2.2	I	CARS and DIAL systems for gas detection and identification
2.3	II	Heterodyne radiometers for signal recognition
2.4	I	Optical fiber systems for measuring physical and chemico-physical quantities

3. Active electro-optical components

	Priority	
3.1	I	Co2 laser
3.2	II	Neodymium laser
3.3	II	Metal vapor laser

4. Passive electro-optical components

	Priority	
4.1	I	Service of electro-optical technologies
4.2	I	Lenses, mirrors, beam mixers, and polarizers
4.3	I	Optical fibers for high-power applications
4.4	I	Adaptive optics and mirrors with phase conjunction

5. Interaction between radiation and biological structures and systems for biomedical applications

	Priority	
5.1	I	Laser systems for photobiological applications
5.2	I	Applied photobiology

4. Projected operating units (average number)

Subproject	Financed by the project	Financed by others	Total
1.	14	4	18
2.	6	3	9
3.	11	2	13
4.	7	1	8
5.	2		2
Total	40	10	50

5. Expected human resources requirement (man years)

Subprojects	Management years					Total		
	I	II	III	IV	V	public	private	overall
1.	25	30	30	30	30	145	30	175

2.	20	25	30	25	25	125	25	150
3.	20	30	25	20	15	110	10	120
4.	20	20	20	20	15	95	10	105
5.	5	5	5	5	5	25	5	30
Total	90	110	110	100	90	500	80	580

6. Breakdown of human resources

	Public	Private	Overall
Man years/Operating unit	12.5	8	11.6
Researchers/Operating unit (Man years/ Operating unit/Duration)	2.5	1.6	2.32

7. Projected overall financing (billions of lire) (at a 5 percent average annual inflation rate)

Subprojects	Management years					Financing	
	I	II	III	IV	V	CNR	Other
1.	3.0	3.4	3.8	3.8	3.9	17.9	4
2.	2.0	2.3	3.0	3.2	3.3	13.8	5
3.	2.5	2.5	2.5	2.0	1.3	10.8	4
4.	1.5	1.8	1.9	1.6	1.1	7.9	2
5.			0.8	0.8	0.7	3.9	
Management	1	1	0.2	0.2	0.2	1.0	
Total	10.0	11.0	12.2	11.6	10.5	55.3	15

8. Breakdown of CNR financing

	1987	Total
Millions of lire/Operating unit	200	1106.0
Millions of lire/Researcher	86.2	476.7

9. Specialists and personnel training

Charged to Project		From Other Sources
Art. 36	Scholarship/year	Scholarship or training and work contract
9	40	20

Finalized Project: New Materials

Feasibility Study

Summary

1. General objectives of the project

This project was chosen from a very wide range of possible areas on the basis of the need to come to grips with the problems concerning materials and related technologies, an area that represents very real development potential for Italian science and technology.

Thus, the research envisaged by the project consists of a highly coordinated set of themes with specific operating objectives. This research is very likely to achieve the proposed objectives, despite the fact that it comes within an area which is, by definition, high risk. Specifically, the common goals of the various subprojects may be summarized as follows:

--the creation of new scientific know-how from which other research sectors may also benefit: this knowledge of chemistry, physics, mechanics, and the science of structures will facilitate progress in the chemistry of the preparation of new materials and in acquiring knowledge of their structure and operational behavior;
--the creation of new technological know-how directly focused on production and manufacturing technologies for new materials, which will be highly innovative compared to the production technologies currently used in Italy;
--the creation of new highly specialized processing activities in both public and private research and in production;
--the creation of new industrial activities for the manufacturing of products with high added-values and high performance standards.

2. Breakdown of the project into subprojects

1. New ceramics
2. Materials, processing, and production technologies for composite materials
3. Materials with particular electric, electronic, and magnetic properties
4. Characterization, properties, and qualification of materials.

3. Project proposals

1. New Ceramics

	Priority	
1.1	I	Processing technologies
1.2	II	Structural ceramics
1.3	I	Electroceramics
1.4	I	Glass

2. Materials, processing, and production technologies for composite materials

	Priority	
2.1	I	Research and formulation of materials
2.2	I	Evaluation of behavior and structures of materials: design methods
2.3	I	Production and assembly technologies

2.4 II Metal-matrix composites
2.5 II Hybrid metal-ceramic systems

3. Materials with special electric, electronic, and magnetic properties

Priority

3.1 I Inorganic semiconductor
3.2 I Magnetic materials
3.3 II Molecular electronics
3.4 II Crystal growth technologies

4. Characterization, properties, and qualification of materials

Priority

4.1 I Definition of the characteristics of material microstructures
4.2 I Phase transitions and properties of materials
4.3 II Qualification of materials

4. Projected operating units (average number)

Subprojects	Financed by the Project		Total
	Totally	Partially	
1.	27	20	47
2.	18	17	35
3.	31	8	39
4.	24	5	29
Total	100	50	150

5. Expected human resources requirement (man years)

Subprojects	Management years					Total		
	I	II	III	IV	V	public	private	overall
1.	30	150	140	130	100	550	410	1120
2.	10	80	110	100	50	360	340	820
3.	50	170	150	140	100	610	150	890
4.	40	100	130	110	100	480	100	670
Total	130	500	530	490	350	2000	1000	3000

6. Breakdown of human resources

	Public	Private	Overall
Man years/Operating unit	20.0	20.0	20.0
Researchers/Operating unit (Man years/ Operating unit/Duration)	4.0	4.0	4.0

7. Projected overall financing (billions of lire)
(at a 5 percent average annual inflation rate)

Subprojects	Management years	Financing

	I	II	III	IV	V	CNR	Other
1.	3.0	5.1	6.2	5.3	3.8	23.4	15
2.	1.5	5.1	9.1	7.8	3.7	27.2	25
3.	3.1	4.9	5.8	4.8	3.5	22.1	10
4.	2.2	2.4	4.2	3.4	2.6	14.8	5.0
Management	0.2	0.2	0.2	0.2	0.2	1.0	
Total	10.0	17.7	25.5	21.5	13.8	88.5	50

8. Breakdown of CNR financing

	1987	Total
Millions of lire/Operating unit	66.6	590.0
Millions of lire/Researcher	16.6	147.5

9. Specialists and personnel training

Charged to Project		From Other Sources
Art. 36	Scholarship/year	Scholarship or training and work contract
12	100	80

Finalized Project: Superconducting And Cryogenic Technologies

Feasibility Study

Summary

1. General objectives of the project

This finalized project aims to place Italian institutes and industries in a relatively autonomous position with regard to other countries. Thus, the project will attempt to maintain, enhance, and develop the ability to conceive, design, produce, and manufacture superconducting materials for the production of magnets, coils made of superconducting materials, electronic superconducting devices, instrumentation based on superconductivity, and cryogenic components and systems necessary to obtain the low temperatures at which superconductivity occurs.

Thus, the objective is to allow Italian heavy industry (the energy sector) and light industry (instrumentation and microelectronics) to maintain their positions in world markets and to acquire new markets.

2. Breakdown of the project into subprojects

	Priority	
1.	I	Superconducting magnets
2.	I	Superconducting and cryogenic materials

3. II Cryogenic components, cryogenerators, and special cryostats
4. III Superconducting instruments for biomagnetism
5. II Superconducting devices

3. Project proposals

1. Superconducting Magnets

1.1 Production of superconducting magnets for carbon-fed MHD converter
1.2 NMR instruments for medical use
1.3 Development of superconducting and hybrid magnets for high-intensity fields

2. Superconducting and cryogenic materials

2.1.1 A-15 superconductors
2.1.2 Nb-Ti-X superconductors
2.1.3 C-13 superconductors (Laves phases)
2.2 Superconducting materials for sensors and components
2.3 Thermic and electric insulating materials and cryogenic fluids: definition of characteristics and pure research

3. Cryogenic component production, special cryogenerators and cryostats

3.1 Cryogenerators
3.2 Design, technology, and construction of special cryostats
3.3 Cryogenic technology for space applications
3.4 Measurement of physical quantities at low temperatures; monitoring of cryogenic and superconducting systems

4. Superconducting instruments for biomagnetism

4.1 Design and construction of multisensor magnetic units
4.2 Optimization of methods for ambient magnetic noise rejection
4.3 Research and optimization of detection electronics and of analog signal filtering methods
4.4 Design and production of data acquisition and signal processing systems

5. Superconducting devices

5.1 Microwave devices
5.2 SQUIDS and SQUIDS systems
5.3 Cryogenic metrology
5.4 Radiation detectors
5.5 Superconducting electronics
5.6 Materials and production technologies for superconducting devices

4. Projected operating units (average number)

Subprojects	Financed by the Project		Total
	totally	partially	
1.	11	2	13
2.	2	3	5
3.	5	3	8
4.	4	1	5
5.	12	1	13
Total	34	10	44

5. Expected human resources requirement (man years)

Subprojects	Management years				Total		
	I	II	III	IV	public	private	overall
1.	8	23	47	34	112	232	344
2.	15	38	16	14	83	48	131
3.	15	50	50	37	152	48	200
4.	12	19	29	20	80	12	92
5.	15	37	56	27	135	188	323
Total	65	167	198	132	562	528	1090

6. Breakdown of human resources

	Public	Private	Overall
Man years/Operating unit	16.5	52.8	24.7
Researchers/Operating unit (Man years/ Operating unit/Duration)	4.1	13.2	6.2

7. Projected overall financing (billions of lire) (at a 5 percent average annual inflation rate)

Subprojects	Management years				Financing	
	I	II	III	IV	CNR	Others
1.	1.5	3.8	7.7	4.5	17.5	6.1
2.	1.1	2.5	0.9	0.6	5.1	1.8
3.	0.8	2.5	2.3	1.4	7.0	2.4
4.	0.6	0.8	1.1	0.6	3.1	1.1
5.	0.9	2.0	2.9	1.1	6.9	2.4
Admin.	0.1	0.1	0.1	0.1	0.4	
Total	5.0	11.7	15.0	8.3	40.02	13.8

8. Breakdown of CNR financing

	1987	Total
Millions of lire/Operating unit	113.6	909.1
Millions of lire/Researcher	18.3	146.6

9. Specialists and personnel training

Charged to Project	From Other Sources

Art. 36	Scholarship/year	Scholarship or training and work contract
9	46	49

Finalized Project: Data Processing Systems And Parallel Computation

Feasibility Study

Summary

1. General objectives of the project

This project incorporates the results of two separate preliminary feasibility studies, one on data processing systems and the other on parallel computation.

Therefore, it has a number of general objectives.

One of the objectives is to include Italy in the plan for technological and methodological innovation in scientific computation launched by the United States in the 1970's. The project aims to accomplish this through the production of "instruments" that will facilitate the use of supercomputers both for high-complexity problem solving in pure and applied science and for the design of technologically sophisticated products. At the same time, the project aims to create competence and a "culture" in parallel computation.

Another objective is to collect and further the results of the finalized computer project, part of the European ESPRIT project and the PREI (National Plan for Date Processing and Electronic Research) particularly in the area of artificial intelligence and the integration of artificial intelligence applications with existing technologies and technologies currently being developed.

A third objective is to develop the innovative level in the Italian software industry and the scientific community in this sector by encouraging them to study and develop advanced software methods and prototypes that will lead to more advantageous use of electronic processors.

2. Breakdown of the project into subprojects

	Priority	
1.	I	Scientific computation for large systems
2.	II	Dedicated processors
3.	VI	Parallel architectures
4.	VII	New languages
5.	III	Advanced systems for databases
6.	V	Methods and instruments for system design

7. IV Support systems for intellectual work
8. IV Support initiatives for parallel computation and software engineering.

3. Project proposals

1. Scientific Computation For Large Systems

1.1 Supercomputer access networks
1.2 Models and simulations
1.3 General-use software for scientific computation

2. Dedicated processors

2.1 Coprocessors and modules for signals and images
2.2 Coprocessors and modules for artificial intelligence
2.3 Coprocessors and systolic modules

3. Parallel architectures

3.1 Multiprocessors
3.2 Non-Von Neumann architectures
3.3 Performance evaluation

4. New languages

4.1 Functional logic and algebraic languages
4.2 Concurrent and object-oriented languages
4.3 Interpreters, compilers, and operation support

5. Advanced systems for databases

5.1 Intelligent databases
5.2 Development of logical interrogation languages
5.3 Interaction with multimedia databases
5.4 Interaction with heterogeneous databases
5.5 Methodologies and instruments for the end user

6. Methods and instruments for system design

6.1 Knowledge engineering
6.2 System specifications
6.3 Techniques of fast prototype production

7. Support systems for intellectual work

7.1 Decision support systems
7.2 Expert systems
7.3 Advanced individual productivity systems

8. Support initiatives for parallel computation and software engineering

8.1 Training and continuing education structures for researchers in parallel computation

8.2 Structures with pilot equipment for software development.

4. Projected operating units (average number)

Subprojects	Financed by the Project totally	partially	Total
1.	30	9	39
2.	11	4	15
3.	8	2	10
4.	9	3	12
5.	11	4	15
6.	9	4	13
7.	7	2	9
8.	5	2	7
Total	90	30	120

5. Expected human resources requirement (man years)

Subprojects	Management years I	II	III	IV	V	Total public	private	overall
1.	80	84	90	90	86	430	120	55
2.	29	31	34	34	32	160	50	210
3.	21	23	26	26	24	120	30	150
4.	23	25	28	28	26	130	40	170
5.	27	29	32	32	30	150	60	210
6.	21	23	26	26	24	120	60	80
7.	17	19	22	22	20	100	30	130
8.	11	13	16	16	14	70	30	100
Total	229	247	274	274	256	1280	420	1700

6. Breakdown of human resources

	Public	Private	Overall
Man years/Operating unit	14.2	14.0	14.2
Researchers/Operating unit (Man years/ Operating unit/Duration)	2.8	2.8	2.8

7. Projected overall financing (billions of lire) (at a 5 percent average annual inflation rate)

Subprojects	Management years I	II	III	IV	V	Financing CNR	Others
1.	2.6	2.6	2.8	2.8	3.0	13.8	5.7
2.	1.4	1.5	1.6	1.7	1.8	8.0	2.5
3.	1.4	1.5	1.6	1.7	1.8	8.0	1.3
4.	1.1	1.1	1.2	1.3	1.3	6.0	1.9

5.	1.6	1.8	1.8	1.9	2.0	9.1	2.5
6.	1.8	1.8	1.8	1.9	2.0	9.3	2.5
7.	1.4	1.5	1.6	1.7	1.8	8.0	1.3
8.	0.5	0.5	0.5	0.6	0.6	2.7	1.3
Management	0.2	0.3	0.3	0.3	0.3	1.4	
Total	12.0	12.6	13.2	13.9	14.6	66.3	19

8. Breakdown of CNR financing

	1987	Total
Millions of lire/Operating unit	100.0	552.5
Millions of lire/Researcher	35.7	197.3

9. Specialists and personnel training

Charged to Project		From Other Sources
Art. 36	Scholarship/year	Scholarship or training and work contract
10	80	50

Finalized Project: Biotechnologies and Bioinstrumentation

Feasibility Study

Summary

1. General Objectives Of The Project

This project combines the results of two preliminary feasibility studies, one dealing with biotechnologies and the other with bioinstrumentation.

Although the scope of the two studies is very different, they share the common goal of contributing to the development in Italy of know-how and production capabilities in life sciences, and they may well make a significant contribution to improving the production of resources in Italy and the rational use of these resources.

For this purpose, the project specifically concentrates on areas of research in which international competition is not overly aggressive or on areas in which Italian researchers have acknowledged expertise so that there is a reasonable chance of success from the start. In the case of bioinstrumentation, the need for miniaturization has led us to confine our research to a single subproject, comprising a very small number of issues involving clinical analysis laboratories.

In both fields, we have tried to avoid duplication of other broad CNR programs, while we have kept in mind the need to supplement these projects both with our research and with other preliminary research studies being conducted in related strategic projects.

On this basis, the project aims to satisfy the frequently expressed need to create a well organized structure for the development of biotechnologies and to improve the technical instruments used in health care.

2. Breakdown Of The Project Into Subprojects

1. Molecular and cellular engineering
2. Biodiagnostics and innovative vaccines
3. Innovations in fermentation processes and bioconversions
4. Biosensors, carriers, and cellular bioreactors
5. Biotechnology applications for cell culture and organ transplants
6. Biopharmaceuticals
7. Bioinstrumentation

3. Project Proposals

1. Molecular And Cellular Engineering

	Priority	
1.1	I	Modifications in protein structures, with the elimination of side effects and the acquisition of specific new properties
1.2	I	Definition of the biochemical characteristics of extremophile [Estremofili] micro-organisms and related modifications using genetic engineering
1.3	II	Modifications in protein solubility to optimize expression and biological functions
1.4	II	Production of engineered glycoproteins to obtain pharmaco-enzymes and to optimize vaccine production
1.5	II	Production of hybrid enzymatic proteins aimed at pharmaco-enzyme targeting
1.6	I	Development of general biochemical engineering strategies for the identification and characterization of new pharmaceuticals (specifically cytotoxic drugs) and pro-drugs
1.7	I	Development of technological innovations to improve the production and control of factors of biochemical interest present in human plasma
1.8	I	Definition of the action mechanisms of the factors involved in activating and or differentiating particular cell types (e.g. chemotaxis factors, enzyme activators and inhibitors, genetic expression modulators)

2. Biodiagnostics And Innovative Vaccines

2.1	II	Production of DNA probes for the diagnosis of infectious human and animal diseases
2.2	I	Development and evaluation of new dosage methodologies for the identification of infectious agents, simplifying specimen preparation
2.3	I	Innovations in the production of murine nonoclonal antibodies (MAB) and human and hybrid monoclonal antibodies

2.4 Innovations in analytical systems geared to the production of immunodiagnostic reagents

2.5 I Development of immunodiagnostic reagents for identifying infectious diseases, dosage of tumor markers, and hormone and bioregulator dosage

2.6 I Applications of immunodiagnostic reagents to "in vivo" diagnostic systems

2.7 I Research geared to the production of innovative vaccines using genetic engineering technology

2.8 I Strategies for the production of vaccines made of synthetic peptides and for optimizing the immune response (e.g. through the use of new carriers and adjuvants)

2.9 II Research geared to the production of anti-idiotypical vaccines.

3. Innovation In Fermentation Processes And Bioconversion

3.1 I Research aimed at genetic improvement of productive strains and their use in fermentation processes (e.g. the construction of particularly effective expression vectors)

3.2 II Characterization of microbe physiology aimed at the industrial use of strains obtained with recombinant DNA, and their use in the degradation of polluting substances

3.3 II Research to improve and control fermentation plants and to automate downstream processing

3.4 I Development of bioreactors with simultaneous regeneration of the coenzyme, and strategies for the construction of second generation bioreactors with optimization of stability and performance

3.5 II Scaling-up of protein purification using innovative methodologies with high resolution capacity

4. Biosensor Carriers And Cellular Bioreactors

4.1 II Study of new immobilization methodologies and the characterization of support membranes aimed at the production of biosensors capable of measuring hematic parameters

4.2 II Study and characterization of new transducer configurations suitable for the production of miniature biosensors for "in vivo" monitoring of hematic parameters

4.3 I Specific manipulations of biological membranes (e.g. by means of selective modification of protein and lipid components) and related structural and functional characterization

4.4 II Construction and characterization of liposomes and other artificial systems for the controled release of pharmaceuticals and bioregulators

4.5 I Construction and characterization of engineered erythrocytes (carriers and cellular bioreactors) for applications in human and veterinary medicine

4.6 II Bioengineering of specific cells using biochemical manipulations in order to develop new diagnostic and therapeutic strategies

5. Applications Of Cell Culture Biotechnologies And Organ Transplants

5.1 I Optimization of animal cell culture technologies (e.g., through the characterization of specific growth factors and innovative immortalization methodologies)

5.2 II Characterization of the action mechanism and production of cell matrix macromolecules

5.3 II Identification, characterization, and production of growth and angiogenesis factors involved in tissue repair processes

5.4 I Development of human keratinocytes for autologous transplants used in the treatment of large-scale burn cases and for elective plastic surgery

5.5 I Cellular line cultures for studying degenerative and dismetabolic pathologies of the nervous system

5.6 II Optimization of plant cell culture technologies

5.7 I Research on molecular organization and on the expression of the genes codifying histocompatibility antigenes to prevent organ transplant rejection

5.8 II Characterization of the optimal conditions (e.g. research on perfusion liquids and development of mechanical perfusion devices) for preserving organs to be used in transplants

5.9 II Development of new diagnostic approaches to prevent the rejection of organ transplants

5.10 I New therapeutic strategies and definition of the parameters capable of predicting toxicity to obtain better survival rates for organ transplants

6. Biopharmaceuticals

6.1 I Isolation and characterization of new factors capable of exerting pharmacological effects

6.2 I Use of new factors for identifying cellular receptors

6.3 I Genetic engineering technologies and development of advanced analysis techniques for investigating the action mechanisms of pharmaceuticals

6.4 II Modifications "in vivo" of genetic material

6.5 II Development of new antibodies and optimization of traditional antibiotic production through genetic engineering

7. Bioinstrumentation

7.1 I Study of standard organizational procedures for clinical analysis laboratories, including the pre- and post-analysis phases

7.2 II Production of hardware subsystems following standard criteria, with special emphasis on workstations for hematology, immunology, clinical chemistry, with field testing of prototypes

7.3 I Study and production of reactors for analytical measurements based on specific electrodes that have already been tested, with special emphasis on measuring the most widely used routine parameters.

7.4 II Study and production of integrated analysis systems using reactors connected to specific electrodes, for use in specific specialized contexts.

4. Projected Operating Units (average number)

Subprojects	Financed by the Project		Total
	totally	partially	
1.	16	8	24
2.	15	11	26
3.	9	6	15
4.	8	4	12
5.	16	9	25
6.	10	9	18
7.	11	9	20
Total	85	55	140

5. Expected Human Resources Requirement (man years)

Subprojects	Management years					Total		
	I	II	III	IV	V	public	private	overall
1.	38	38	38	38	38	190	100	290
2.	38	38	38	38	38	190	140	330
3.	20	20	20	20	20	100	60	160
4.	18	18	18	18	18	90	50	140
5.	34	34	34	34	34	170	90	260
6.	24	24	24	24	24	120	100	220
7.	50	50	50	50	50	250	150	400
Total	222	222	222	222	222	1110	690	1800

6. Breakdown of Human Resources

	Public	Private	Overall
Man years/Operating unit	13.0	12.5	12.9
Researchers/Operating unit (Man years/ Operating unit/Duration)	2.6	2.5	2.6

7. Projected Overall Financing (billions of lire)
(at a 5 percent average annual inflation rate)

Subprojects	Management years					Financing	
	I	II	III	IV	V	CNR	Others
1.	2.6	2.7	2.9	3.0	3.2	14.4	10
2.	2.9	3.0	3.2	3.4	3.6	16.1	11
3.	1.4	1.5	1.6	1.6	1.7	7.8	5
4.	1.3	1.4	1.4	1.5	1.6	7.2	5
5.	2.3	2.4	2.5	2.7	2.8	12.7	9
6.	2.0	2.1	2.2	2.3	2.4	11.0	8
7.	3.0	3.1	3.3	3.5	3.6	16.5	12
Management	0.5	0.5	0.5	0.5	0.5	2.5	
Total	16.0	16.7	17.6	18.5	19.4	88.2	60.0

8. Breakdown Of Financial Resources

	1987	Total
Millions of lire/Operating unit	114.3	630.0
Millions of lire/Researcher	44.0	242.3

9. Specialists And Personnel Training

Charged to Project		From Other Sources
Art. 36	Scholarships/year	Scholarship or training and work contract
9	70	50

8615
CSO: 3698/M240

BRIEFS

OSLO SCIENCE PARK PLANNED--Oslo--A research city is being planned for Oslo. It will be located in the Blindern area near the university and research institutes and it will be completed in early 1989. The research city, or research park as the Norwegians call it, is a project that is backed by Oslo University, NTNF (the Norwegian equivalent of the Swedish STU, the Board for Technological Development), and a number of large industrial firms. "Our goal with regard to the park is to improve cooperation between industry and research," said director Svenning Torp of Innovationscentrum, which will be responsible for operating the park. Construction is being financed by private funds. The park will be operated by Innovationscentrum, which was created by the Municipality of Oslo, the Industrial Fund, and the Departments of Mathematics and Natural Sciences at Oslo University. The research park in Oslo will be the first in Norway. "The areas in which we intend to invest reflect the activities of the university. They include information science, biotechnology, materials technology, social sciences, and a so-called greenhouse," according to Svenning Torp. In the "greenhouse," people who want to start their own activities can rent space and receive help in the form of support services. "They can only rent space during a limited time, after which they will be kicked out. Then they must fly with their own wings," Svenning Torp said. [By Christer Kallstrom] [Text] [Stockholm NY TEKNIK in Swedish 14 Apr 87 p 8] 9336

SWEDISH HIGH TECHNOLOGY LAGGING--The Swedish high technology industry is lagging behind. Parts of the electronics industry are having trouble competing on the world market. This was indicated by a report from the National Industrial Board (SIND) to be used for long-range planning. High technology, which accounts for 7 percent of Sweden's industrial production, has not been particularly expansive. "One reason is that investments in research and development will not yield results before the 1990's," Emil Ems of SIND explained. "We have also seen that companies have been unable to benefit from the devaluations." The basic Swedish industries--manufacturing, steel, and pulp--must be responsible for growth in the Swedish economy during the foreseeable future. In order to be competitive, our industry will need a high level of technology in production processes, according to SIND. "Nothing can be said with certainty concerning the future of high tech industries," Emil Ems pointed out. "We have seen things go well for the pharmaceutical and chemical industries. Telecommunications products are doing well in the electronics industry, but the rest of the electronics industry is having difficulties." [By Margot Granvik] [Text] [Stockholm NY TEKNIK in Swedish 14 Apr 87 p 3] 9336

CSO: 3698/413

NORWAY CLAIMS USSR ABLE TO DEVELOP SUBMARINE PROPELLER

Stockholm NY TEKNIK in Swedish 14 Apr 87 p 6

[Article by Christer Kallstrom]

[Text] Oslo--Technical experts in Norway do not believe that the Soviet Union has produced silent propellers for submarines with the help of computer equipment from Kongsbergs Vapenfabrikk.

"The most important element is the design itself," said Professor Oyvind Bjorke of the Norwegian Institute of Technology. With the proper design, the propeller can be made manually.

The American Pentagon claims that Kongsbergs Vapenfabrikk (KV) has violated the COCOM export regulations that control Western trade with the East Bloc with regard to high technology. According to the American Defense Department, KV violated the regulations from 1980 to 1984 by delivering computer programs for a digitally controlled milling machine manufactured by Toshiba, which was then sold to the Soviet Navy. With the help of this machine, the Soviet Union is supposed to have produced silent submarine propellers.

Prof Oyvind Bjorke categorically rejects the Pentagon's claim. Bjorke himself helped develop the control system for the milling machine.

"The Americans should get their own house in order before they make such accusations. Their export of the powerful DEC VAX computer to the Soviet Union gives them a significantly better tool than the milling machine for developing silent propellers," Oyvind Bjorke said.

Manufacture By Hand

"To produce a propeller of this type, you must have the proper design. Once you have this, it is easy to produce the propeller by hand with honing and laser-controlled feed. Of course, it is easier if you have an advanced milling machine available, but that is certainly not necessary for the work," Oyvind Bjorke said.

The control system in question was first demonstrated at an exhibition in Paris in 1969. In order for KV to export the system to the East Bloc, it produced a special "Eastern version" that did not violate the COCOM regulations.

The milling machines that were delivered to the Soviet Union can only work on two angles at once. KV is permitted to deliver software to the West that permits the machine to mill at nine different angles simultaneously.

"The KV control system is in no way exclusive. Similar systems are found at most mechanical companies in Europe, Japan, and the United States," Oyvind Bjorke said.

The Defense Research Institute (FFI) in Oslo also rejects the American claims concerning technology smuggling.

9336
CSO: 3698/413

EXPORT REGULATIONS EASED FOR SWEDEN

Stockholm NY TEKNIK in Swedish 14 Apr 87 p 3

[Article by Mikael Holmstrom and Tom von Sivers]

[Text] The United States government is now backing away from its hard line on high technology controls. An important change was made last week.

For Sweden, this means that a number of Swedish products containing American parts will now be declassified.

This became clear on 23 March. After a year-long struggle, the United States Commerce Department had won a partial victory over the Pentagon. Effective immediately, American export controls were eased.

This measure has important implications for all Swedish companies that use American parts and components in their products.

"This is of enormous significance. It solves many of our problems," said Torbjorn Spector of the Stockholm Chamber of Commerce.

Previously, if a Swedish product contained even a single American component subject to control, then the American regulations applied to the entire product.

"If there is one American chip, it's American all the way," a representative of the United States Commerce Department told Swedish industry in 1983.

This meant that many Swedish goods could not be exported from Sweden without the permission of the United States Commerce Department.

Molded In

One way to avoid seeking permission from Washington was to mold in components so that they would be destroyed if anyone tried to take them out. Consequently, American components are entirely molded into certain Swedish sewing machines and steamrollers.

Beginning last Monday, however, the following general rules apply:

Exports from Sweden to the West:

Exports are unrestricted if American parts, components, and materials comprise no more than 25 percent of the value of the goods. If this condition is met, then exports are unrestricted to 91 countries.

Exports from Sweden to the East and to China: Exports are unrestricted if American parts, components, and materials do not exceed 10 percent of the value of the goods, or a maximum of $10,000.

In addition, one rule is being dropped that previously discriminated against companies outside the United States. In the past, export controls could be required for a product made in Sweden, even though a similar American product could be exported from the United States without a permit.

Feverish Activity

Companies that have received the news concerning changes in the regulations are now working feverishly to find out how many of their products have been declassified. Agema Infrared System of Danderyd manufactures thermographic cameras.

"We are extremely pleased. Our basic assortment, which contains American parts, can now be exported without restrictions," said executive vice president Leif Bergstrom.

Other companies have stopped using American components in favor of Japanese components, for example, which are not subject to control.

The same pattern may be seen throughout the world. American component manufacturers are losing ground to their competitors, especially in Asia.

This was also confirmed in a telegram from Washington to United States Embassies throughout the world. The change in the regulations was justified as follows:

"Foreign companies have replaced United States components in order to avoid American export controls on products manufactured abroad."

A Single Page

But this change affects only a single page of the 600-page export regulations on high technology. It could be the first of a series of important changes, however. Several factors are behind these developments:

The trade deficit of the United States is increasing and "competitiveness" is an in-word in Washington following Ronald Reagan's speech to the nation last January.

The American Academy of Sciences has determined that regulations that are too strict and inflexible are harmful to the interests of the United States.

Several years of lobbying by the industry both in the United States and abroad--including Swedish industry--has begun to yield results.

9336
CSO: 3698/413

BRIEFS

FRG-USSR JOINT VENTURES--Moscow, 28-29 Mar (VWD)--To date the USSR has concluded concrete agreements for joint ventures with 12 foreign firms. An additional 39 joint projects "have been outlined," said the acting Soviet minister president, Vladimir Kamentsen in Moscow. According to Kamentsen, the USSR considers 121 of the approximately 200 offers from around the world to be of interest. There are agreements for a joint venture with a Finnish firm for the recycling of used plastics. A structural timber project is being prepared with Japan. The West German economy is involved in joint projects for the production of self-propelled cranes and for the production of shoes. In connection with the latter, Kamentsen mentioned Salamander AG of Kornwestheim. [Article: "USSR--Twelve Joint Ventures Assured: Solid Results"] [Text] [Duesseldorf HANDELSBLATT in German 30 Mar 87 p 11] 12552

CSO: 3698/383

ACTIVITIES OF BULGARIAN SOLID-STATE PHYSICS INSTITUTE

Sofia SOFIA in Bulgarian No 3, 1987 p 19

[Interview with Academician Milko Borisov, director of Consolidated Physics Center of Bulgarian Academy of Sciences and director of Solid-State Physics Institute, by SOFIA magazine; date, place, and occasion not given: "Solid-State Physics Institute"]

[Text] [Question] What is the place of solid-state physics in the promotion of the scientific and technical revolution?

[Answer] Solid-state physics is the basis of materials technology. Without it, new materials cannot be created for the needs of machine building, electrical engineering, and electronics. The needs of the practical world and of scientific and technical progress are an increasingly important stimulus to its development. The development and production of electronic elements are closely connected with the creation and production of new materials; with the development of new complex technologies, now called microelectronic technologies; with the use of the most modern measurement technology and means of automation; with the transition to ever smaller dimensions of the individual elements of integrated circuits and an ever greater number of elements on the surface of a crystal plate; with the use of new physical phenomena and information carriers.

[Question] What is the level of developments at the institute?

[Answer] The institute has existed independently for 15 years. Solid-state physics in our country, however, has considerably older traditions--from the very establishment of the Physics Institute at Sofia University 90 years ago. Our institute now is comparatively small and still lacks acequate material facilities necessary for work in modern areas of condensed-state physics and on the physical principles of microelectronics. This hinders our making full use of the labor and skills of scientists and specialists. But we firmly believe that the responsible institutions concerned in our country will show the efficiency and persistence necessary for the building of modern facilities in the shortest possible time periods.

Our research is now concentrated on the physical principles of microelectronics; on the creation of new sensors and sensory devices based on microelectronic principles and technologies; on the investigation of the physical

principles of acoustoelectronics and acoustoelectronic instruments; the principles of optoelectronics, molecular epitaxy, low-temperature and liquid-crystal physics. At the institute, an optics and spectroscopy department is being developed which will investigate, besides, the modern specializations of thin-layer and integrated optics; will work also on certain areas of gas lasers and metallic-vapor lasers, and study the creation of laser systems and apparatus.

In keeping with the decisions of the 13th BCP Congress, the level of our work must measure up to world-class specifications. To achieve them, we are maintaining the closest contacts and cooperation with the leading institutes of the Soviet Union in all the scientific areas studied by us. We are also studying the experience and achievements of many other leading institutes in the world. We feel that in these contacts, which are useful for us, we are a sought-after and equal partner. Our institute is host to the International School of Modern Problems in the Physics of the Condensed State of Matter. We are full participants also in the international schools of physical problems in microelectronics, as well as in other international measures in spectroscopy, optics, and liquid crystals.

[Question] What is the institute's relation with Sofia industry?

[Answer] Useful relations have been established for a very long time between the institute and some departmental institutes and industrial enterprises in Sofia and the country. The present Microelectronics Institute, for example, originated on the basis of the Microelectronics Section in the then Physics Institute. The X-ray topographic methods that we developed to test for defects on the surface of silicon plates after technological processing have been used at this institute and are now also employed at the Microelectronics Combine in Botevgrad. Of long standing, too, are our relations with the Sofia Plant for Converter Elements in the area of quartz and of quartz instruments for frequency control and selection. Our institute's relations with the scientific production combines involved in optics and laser technology in Sofia and Plovdiv are useful.

Our understanding, reinforced by the governing body of the BAN [Bulgarian Academy of Sciences], is that to become a more efficient "research-introduction-production" chain, some of our developments must be brought to the stage of introduction and pilot (semicommercial) production at the institute itself or at BAN facilities. We already have favorable results from the photoresistors and magnetosensitive transistors which we developed and which, together with the Applied Physics Institute at Plovdiv, are being introduced into production there. It is important to create such opportunities in Sofia for the pilot production of some of our products. We are now organizing small-scale production of tubes for the new copper-bromide-vapor laser.

[Question] Are young people admitted to the institute and awarded academic degrees?

[Answer] It can be said that the matriculation of personnel and the acquiring by them of scientific degrees and ranks at the institute is proceeding

normally. But this process can be improved still more if the new replenishment of scientific personnel is selected early on from among the students at the higher educational institutions, or even as early as students from the upper classes in secondary schools who demonstrate the traits and aspiration for scientific work. In this connection, individual work by older and more experienced scientists with their younger and beginning colleagues must be significantly intensified and made still more effective. We are making efforts to intensify relations also with other institutes concerned with similar subject matter, as well as with higher educational institutions, where the solution of some of the scientific problems now assigned to our institute might also begin. This will heighten the responsibility of the students in the upper classes and make their eventual transition to scientific work more natural.

Ever greater cooperation is now observable among the different natural sciences. Along with mathematics, the theoretical and experimental methods devised by physics are already increasingly permeating the other natural sciences, while new ideas from the latter tinge some sectors of physics as well, as, for example, the idea of evolution, which is evidenced not only in biology, but also in the nonequilibrium and nonlinear thermodynamics of physics. The boundaries between the individual sciences are increasingly disappearing--organic molecules, for example, are also studied by physics as elements of information processing. Our institute studies biological membranes--from a liquid-crystal viewpoint. "Interstitial" sciences--physical chemistry, biophysics, etc.--are being cultivated more and more rapidly. A universal system of knowledge is taking shape, the ultimate goal of which is the good of man.

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EXHIBITS AT LEIPZIG, PLOVDIV FAIRS

Leipzig Fair Evaluated

Warsaw PRZEGLAD TECHNICZNY in Polish No 44, 2 Nov 86 pp 24-25

[Text] The annual spring Leipzig Fair took place under the slogan, "For open world trade and technical progress." Participating in the fair were 6,000 exhibitors from over 100 socialist, capitalist, and developing countries. Offered for sale were 29 groups of trade goods for investment and consumption.

A presentation or even an enumeration of the equipment and products exhibited in Leipzig is not possible due to their number and variety. So out of necessity I am limiting my report to certain observations and presentation of several offerings. I'll begin with the host of the fair, the GDR. The results of applying modern technology, including the use of microelectronics, robotics, and also management technique using electronic data processing were presented by 2,800 factories and enterprises. Of great interest were products from Robotron, a firm known in Poland, including professional and personal computers. Also articles from the world-renowned firm, VEB Carl Zeiss Jena. It offered many kinds of optical glass for eyeglasses, opera glasses, cameras, and microscopes up to giant telescopes, as well as multicolored, fine ornamental glasses. As at every fair, innovations in the automotive industry attracted attention. It is difficult indeed to discuss these new things, and yet the rich offering of Simson motorcycles and mopeds impressed this arrival from a country which has ceased motorcycle production. There were Wartburg and Trabant personal automobiles which are popular in Poland too, only slightly modified. On the other hand, the VEB IFA plant in Ludwigsfeld presented trucks, including specialized ones such as tank trucks, semi tractor-trailers for transporting containers, dump trucks, mobile cranes, fire trucks, a whole family of Roburs including microbuses and ambulances, and various multi-purpose vehicles.

A 6-cyclinder diesel engine already in batch production was an interesting novelty. It has increased engine power, requires less fuel, and is more durable. The working pistons are made of ferrographite alloy, due to which their thermal conductivity and fuel consumption are reduced to a minimum, and also the emission of toxic gasses is reduced. This engine can easily be started at a low temperature like minus 15 degrees C. The relatively low number of revolutions gives rise to the relatively low fuel consumption, 26 liters per 100 km, and

reduces noise to a minimum. Among others equipped with this motor is the 6-ton IFA-L60 tractor, which has an 8-step gear box, and is designed and outfitted according to the newest international standards.

Poland was represented by more than 25 foreign-trade enterprises which took part in 5 expositions of investment trade articles and goods for consumption in 6 market houses and department stores. The import-export firm CIECH displayed, among other things, samples of crude sulfur, various dyes, and articles from the rubber industry. One of the largest exhibitors of woodworking machine tools was Polimex-Cekop Enterprise, which presented completely modernized machines (produced within the framework of specialization between CEMA: two combined woodworking machine tools for planning and smoothing large units from wood or for milling them. Moreover, they showed a circular saw and a band saw for working wood and synthetic materials. In the "Plastmed" exposition in the Bugra department store, the Polish foreign trade enterprises Varimex and Labimex offered surgical instruments and specialized apparatus and articles, such as laboratory glassware and centrifuge tubes. Poland is one of the largest exhibitors of foods, glass, porcelain, textile, and leather articles, stationery, and toys. In the Messehof and Petershof department stores, foreign trade enterprises Agros, Hortex, Interpregro, Polcoop, and Ralimpex offered fresh and frozen fruits and vegetables, and also fruit products, alcoholic wares, and candy.

In the Ring-Messehaus department store at the Textilimpex and Polcotex trade stalls, much interest was aroused by the collections of men's, women's, and children's clothing, distinguished by their variety of patterns and latest fashion requirements. I heard a couple young Poles sigh loudly, for such articles cannot be found in stores in Poland. Ceramic and glass articles shown by Minex in the Maedler-Passage department store also met with approval. Coopexim offered toys and leather products, including bags, leather haberdashery, suitcases and wicker baskets with leather elements, and Remex showed souvenirs and tourist wares. Polmot, which offered automobile accessories next to Remex, took note of their presence. Universal foreign trade enterprise, which showed household articles in Handelshof department store, ranked among the exhibitors counted.

Traditionally the Soviet Union was counted among the largest exhibitors. It was represented by 22 foreign trade enterprises, various ministries, and international economic organizations like Assofoto and Domochin. Especial attention was paid to products from the chemical industry, the industry building machines for chemistry, and the automotive industry, including a family of passenger cars which we have already described in PRZEGLAD TECHNICZNY, and special trailers for transporting them. POLYMIR Industrial Association presented high-pressure polyethylene and articles made from it. The rich offering of foodstuffs produced in all republics of the union stood out. It is worth noting the first appearance in Leipzig of the Chinese enterprise China National Native Produce and EX Export Corporation, which offered leather products and fur coats. Also for the first time at this fair the Rungra 888 EX and Import Corporation from the DPRK represented this same line of business.

Noted concerns from capitalist countries like the FRG, France, Great Britain, Italy, Belgium, Holland, Japan, Sweden, Austria, or Finland, and even from little Liechtenstein were fairly widely represented. The best known overseas firms were represented by the Japanese firms Mitsubishi, Mitsui, Sumimoto, Nichmen, Nissho-Iwai, Marubeni, and C. Itol as well as the North American concerns Du Pont, Dow Chemical, and Union Carbide. They participated in the complex arranged for the exhibition of chemistry and equipment for the chemical industry. In comparison with past years, the number of exhibitors from the automotive industry grew considerably. The Western European automotive industry was the most strongly represented...the French concerns Renault, Citroen, and Peugeot; BMW, Daimler Benz, M.A.N., and Volkswagen from FRG; and Italian Fiat and Swedish Volvo. The firms of Toyota from Japan and Ford from Great Britain appeared in Leipzig for the first time. The 2-person VW "Skooter" 3-wheeler, glossy like ebony and which attains a speed of 240 km per hour, was a hit.

During the spring Leipzig Fair various scientific-technical conferences are organized, constituting an occasion for presenting the newest accomplishments. Potential purchasers can get first-hand information on innovations. For the second time the International Congress of Scientific Textile Technology met, devoted to the newest achievement and problems of developing textile technology and applying it.

Participants in the spring Leipzig Fair "86" were informed of the main themes of next year's fair. It will be run under the slogan, "Effectively produce and process foodstuffs." From 18 to 20 March the International Trade Congress "Agrotech-87" will meet, which will be concerned with developmental trends in the food of mankind, experiences and accomplishments of the GDR in the development of agricultural production, the newest achievements in automated processes for plant and animal production, buildings and equipment for freezing and preserving agricultural products, and technology and equipment for raising fish, for fishing, and making fish products. During the spring 1987 fair, the International Congress "Agrochem 87" will be organized, which will be concerned with world application of agrochemicals, including fertilizers, potassium salts, liquid fertilizers, and also plant protection agents. Moreover, attainments in the technical improvement of agricultural production processes, scientific-technical services for agriculture, application of machines, equipment, etc. will be discussed.

A handful of personal reflections on things other than the fair. Leipzig, which is the largest city in the GDR after Berlin, has several faces. In the city center beautiful old architecture coexists with the modern. However, riding several trolley stops is enough to find oneself among rows of not very handsome tenement houses from the turn of the centruy, whereas on the outskirts of town new developments grew, keenly reminiscent of our own but with a better network of shops and schools, health centers, etc. During the days of the fair crowds of people trod the streets of the old city, such as Ritterstrasse or Peterstrasse, in search of attractive goods and fair souvenirs. It was more crowded here than on the fairgrounds. One can satisfy one's appetite well and cheaply

in the numerous little cafes and restaurants. In the "Kaffebaum" house on Fleischergasse (Rzezniczej) in the oldest little cafe in the city, in which at sometime Goethe, Lessing, Liszt, Wagner, and Schumann sat, they serve good, strong coffee, I am told, like during the times of celebrity, but prepared in the modern way. Undoubtedly the old churches from the 13th and later centuries, and the gothic cathedral of St Thomas in which the tomb of Johann Sebastian Bach is located, are a windfall for monument lovers. In a city rich in musical tradition, music lovers can listen to concerts by symphony orchestras in the modern Gewandhaus or enjoy jazz in other places.

Having ridden the train through Elstera I musted on the fate of Prince Jozef Poniatowski, whom the waves swallowed up during a battle between nations in 1813. Certain reflections occur to one, as to a reporter concerned with public transportation in his journalism. The city's transportation network has a good, functional layout. In one sense, its skeleton is the S-Bahn electric railway connecting the center (Main Station) with outlying districts. Stops are situated fairly close together, and are connected with trolley and bus stops. Trolleys and buses reach even farther than the S-Bahn, which has gradually be extended. A dozen or so "normal" railway lines still exist with some scores of stops. On these means of locomotion there basically is no crowd, as can happen outside of the trolleys. This is strange to an inhabitant of Warsaw who is accustomed not only to crowds but also the the fact that the electric train runs every few minutes along the east-west axis, and that everyone complains that this is too infrequent. On the other hand, in Leipzig the S-Bahn runs every 20 minutes during rush hour, and every hour outside that.

The Hauptbanhof, the largest railway station in Europe, with its 13 platforms and several giant halls unfortunately does not make the best impression, not only because of its heavy 19th-century architecture but because...brooms are too rarely used here. And when a citizen of our country wished to buy a railway ticket at this station at 10 pm and found only one window out of 32 open and duly had to stand and wait, and on another day at the Militzer Alee S-Bahn stop he heard an announcement that his train was cancelled and the next would be along in an hour, he stopped being surprised when he arrived breathless at the Hauptbanhof and learned that the Schnellzug [express train] to Berlin was delayed a half hour. He felt as if he were at home...

Plovdiv Technical Fair

Warsaw PRZEGLAD TECHNICZNY in Polish No 50, 14 Dec 86 pp 26, 27

[Text] Those who have been at the International Technical Fair in Plovdiv more than once claim that it swells from year to year. Perhaps this is true, since last spring there were 2034 foreign firms in Plovdiv, and this year there are 2175 from 35 countries. To a person here for the first time like myself, the fair seems smaller than the fair in Poznan. One can get to a pavilion already visited again without difficulty, and move about without a map with no trouble.

Significantly fewer visitors are moving about the fairgrounds than in Poznan. Also not seen is the crows of excited kids running from pavilion to pavilion,

from stall to stall feverishly collecting all possible printed advertisements. Larger groups of people could be found at the tempting open-air exhibits from Renault, at the face-lifted version of our "maluch" ["pre-school child"; a small Fiat], and at several commercial stalls selling knitting, shoes, and various trinkets. There were no crowds at the food stands, but this was probably because they were placed every few meters.

The host country's exhibition covered 44,000 square meters of space, and foreign exhibitors took up somewhat over 53,000 square meters. Almost 800 Bulgarian enterprises presenting 7,000 exhibits participated in the fair. Of these, 41 percent were innovations shown for the first time to specialists and fair guests. More than half the exhibit space was taken up by the Bulgarian machine industry with nearly 3,000 exhibits, among which Balkankar loomed large with means of intraplant transports.

The electronics industry presented more than 850 exhibits. Izotimpex or IZOT Office of Trade Associations is the largest exporter of electronics technology in the CEMA countries. Its exports bring in 1.5 million rubles annually. In the Izotimpex pavilion one could look at various computer equipment. Among other things, Bulgaria specializes in production of floppy disks. The highlight of the exhibit was the 8- and 16-bit microcomputers from the "Prawec" series. Bulgaria is aiming to produce 200,000 of these computers annually. Next year there will already be 50,000 of them for internal consumption and for export, mostly to the Soviet Union. Our Metronex became interested in these computers at the Plovdiv fair. It is hard to say today whether they will be available in our market. With total certainty it will be possible to see them at the International Exhibition of Computer Technology Applications INFOSYSTEM'87, which will take place next April in Wroclaw. We have already written about it here, for this undertaking was born from the initiative of PRZEGLAD TECHNICZNY and ELWRO Electronics Establishments. Just in Plovdiv the ELWRO representative secured a promise from the Izotimpex director that Bulgaria would present its most interesting equipment for electronic computing technology. In Plovdiv our Metronex signed an agreement with Izotimpex for a mutual trade transaction; we will import disk memories from Bulgaria, whereas the Bulgarians will import our printers.

Poland is a traditional participant in the International Fairs in Plovdiv, both in the autumn consumer fairs and in the spring technical fairs. This year 29 Polish trade head offices participated in the spring undertaking. BUMAR came forth with the largest exhibit. Bulgaria has long been a customer for our construction and road maintenance machinery. Since 1971 we have provided Bulgaria with about 8,000 various machines, including over 3,000 loaders and 1,500 excavators.

This year for the first time BUMAR exhibited the L201 loader, a modified version of the L200, which is produced in cooperation with a Bulgarian partner, the Excavator and Loader Plants in Kavarna. The cooperation of BUMAR with a Bulgarian industry has every chance for further development. Presently trade-technical talks are taking place concerning the joint production of excavators with a

bucket capacity of 1 cubic meter. BUMAR imports small excavator-bulldozers with shovels not manufactured in Poland from Bulgaria. The annual transactions between BUMAR and Bulgarian trade offices reach 25-30 million rubles.

AGROMET-MOTOIMPORT presented a slightly smaller exhibit than BUMAR.

A "Pyros" trailer was shown, as well as agricultural machines, including a grain sower, a potato sorter, machines for grinding corncobs, and a corn shucker. A model of a mini steel mill, many machines and fittings for metallurgy, and complete foundries were shown in the CENTROZAP booth. Our electric machine industry was substantially in evidence in the Polish exhibition pavilion. Elektrim, which represents it, exports to Bulgaria among other things nuclear and conventional energy equipment, articles of strong-current electrotechnology and communication equipment. One of the three Polish gold medalists at this year's 42d Technical Fair in Plovdiv emerged out of the representative exhibits at the Elektrim booth: the TELDIS dispatcher's and secretarial-manager's system made by Telko-Telfa from Bydgoszcz. This equipment is very functional, easy to use, and has many more possibilities and better parameters than this type of equipment produced in other RWPG countries. Experts affirm that it would win in competition with the Italian equipment also exhibited in Plovdiv. The gold medal may be a good calling card for TELDIS in trade talks with foreign partners.

Elektrim is a very respectable trade partner for the Bulgarian economy. Its exports attain 50 million rubles annually. A major export is service, but most important is the construction of a nuclear power station in Kozloduy.

A goodly crowd surrounded our Fiat 126p, which may only rarely be encountered on Bulgarian roads. The "Maluch" [small Fiat] came to Plovdiv as the result of the initiative by the FSM Foreign Trade Office, for the factory is interested in a cooperative tie with Bulgaria in the production of several Fiat 126p elements, including alternators, road wheel tires, and valve springs. The "Maluch" certainly attracted crowds of visitors, but had no pretensions to a gold medal. On the other hand, the fire engine mounted on a Stara 266 undercarriage in the Katowice Metal Plants in Silesian Siemianowice both aspired to and won it. The "Proszkowiec" [Powderer], so called because of the type of fire-extinguishing medium with which it is equipped, is meant primarily for use at airports. It attracted the interest not only of visitors, but also of Bulgarian traders.

Our third and, unfortunately, last gold "disk" came to us for microprocessor-controlled infusion pump type 605, designed for the programmed infusion of intravenous medicines, infusing fluids, and blood-derived products. It was developed by Medipan, but was exhibited in the Labinex booth. There one could also see other interesting exhibits, including scientific research apparatus.

The medal-winning exhibits are not the only ones which have a chance of landing in Bulgaria. This market is very interesting to us. This last year, the term for implementing the 1981-1985 multi-year Polish-Bulgarian agreement expired. It assumed there would be about 3 billion rubles' worth of mutual transactions, and in fact the turnover brought in 3.5 billion rubles. Our exports of machines

and equipment and construction services were subject to duplication. About 100,000 of our Fiats, Nysas, and Zuks are on Bulgarian roads. The Bulgarian agricultural air service is outfitted mainly with Polish AN-2 and M-18 airplanes. Many chemical plants and several sugar refineries, foundries, and coal mines work with Polish equipment. At present more than 3,000 Polish specialists are working in Bulgaria, including those at the nuclear power plant construction site mentioned above, in the Kremikowka Metallurgical Plant in Ruse, and in the Cuprate Plant in Sredniogoro. We are constructing hotels and other tourist buildings in Sofia, Borowiec, and Pamporow, which are great centers for winter sports.

On the other hand, in Poland there are more than 65,000 battery-run electric and internal-combustion trucks from Balkankar in use, and our computer systems are equipped with Bulgarian-produced memories. Inhabitants of our large cities are supplied with early vegetables from the 50 greenhouses built by Bulgarian specialists, and 13 bulk cargo ships built in Varna are afloat under our flag.

The renewed multi-year agreement for 1986-1990 signed in April this year assumes there will be mutual transactions in these years worth 4,360 million rubles, of which 2,350 million rubles will come from our exports to Bulgaria.

A superficial review, for that's all I had the time to do, of the Bulgarian exhibition in Plovdiv showed that there are things we can buy in Bulgaria. Among other things, there are more and more improved trucks for internal transport, telphers, metal working tools, refrigerating units, computer memories, electric hand tools, coal cars, and ships for bulk cargo. We can also obtain sweet grapes and paprika for our wares in Bulgaria, if the weather conditions are not disappointing. And there are also places for our tourists in the renovated resourts on the Black Sea.

At the fair we finalized trade agreements for export of our industrial products for about 48 million rubles. On the other hand, we bought about 123 million rubles' worth. The major items for import are internal-combustion and electric trucks, electric tools, floppy disks for computers, and up to 28 million rubles' worth of spare truck parts, which undoubtedly will delight their users.

The fact that we bought more than we sold should not worry anyone; our trade balance with Bulgaria is positive. If we were to trade with other countries in this way, we would not have to worry about the future.

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BRAZILIAN GOVERNMENT TO AID ADVANCED MATERIALS R&D

Brasilia BRASIL CIENCIA in Portuguese 6 May 87 p 3

[Text] The first "Two-Year Plan for the Scientific and Technological Development of Advanced Materials" has just been released by the Ministry of Science and Technology (MCT). The plan calls for an investment of 510 million cruzados from the MCT's own budget to be allocated before year's end to increase research in this field, consolidate the existing infrastructure and implement production facilities. The plan has budgeted 1.15 billion cruzados for next year. This includes personnel training: 1,500 post-graduates in Brazil and abroad in 1987 and 2,850 in 1988.

Advanced materials have strategic importance for national development over the next several decades. Discoveries may change the way raw materials are produced and used and radically alter the current face of industry, dictating the blossoming of some industries and the withering of others.

As happens in industries with leading-edge technologies, these advances may result in the reranking of countries in the world economy, allowing those that use new processes to become more competitive and outdistance those that continue using conventional materials.

Five areas have been given priority for funding: metals and special alloys, advanced ceramics, quartz and silicon, and special and compound polymers. The development of these areas is considered crucial for the advancement of such high-tech industries as computers, biotechnology, optics and aerospace.

Each area has specific applications. The development of new alloys may meet requirements that have not yet been satisfied by materials avaialable today, benefiting the automotive and heavy-equipment industries, for example. Advanced ceramics are noted for their superconducting properties, which may realize huge savings in the transmission of electric power without loss. Quartz and silicon are the most important materials for the computer industry.

The study also encompassed Brazil's strategic mineral reserves for developing advanced materials. In certain valuable elements, Brazil has what amounts to a virtual monopoly: quartz (95 percent), niobium (86 percent), titanium, beryllium and rare earths.

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CSO: 3699/65

BRIEFS

BRAZILIAN BIOTECHNOLOGY ASSOCIATION FORMED--At the close of the European and Latin American Biotechnology Seminar sponsored by the European Economic Community from 27 to 29 April, scientists, businessmen and advanced technicians comprising the Brazilian delegation decided to form the Brazilian Biotechnology Association as a non-profit organization promoting all the various aspects of biotechnology. Encouraged by the results of their meeting, the Brazilians released a "Brussels Letter" on 1 May explaining the founding of the Brazilian Biotechnology Association as due to the need to join forces, particularly personnel, to accelerate development of biotechnology in Brazil. The new association will only accept physical persons as members, i.e, private and government researchers and professionals. [Text] [Brasilia BRASIL CIENCIA in Portuguese 6 May 87 p 3] 8844

CSO: 3699/65

BRIEFS

BRAZILIAN SOFTWARE CONGLOMERATE FORMED--The Brazilian Software Conglomerate, a consortium consisting of the Technologiacl Center for Computers (CTI), the Banco do Brasil and EMBRAPA, supported by the Ministry of Science and Technology, CNPq and FINEP, was set up on 27 April. Minister Renato Archer presided at the ceremony to sign the agreements, which was attended by the directors of all the agencies involved as well as representatives from other ministries. The Brazilian Software Conglomerate, which represents an initial investment of $28 million over 5 years, is to develop methodology and engineering for writing computer programs for the banking, livestock and agricultural industries in order to accelerate the process of improving product quality. The consortium, whose consultant will be International Software Systems (ISS), a North American company, is an attempt to break with the cottage-industry approach to writing software in Brazil. Using its newly acquired resources, CTI's first phase will be the development of "generic technology," which is used by both the Banco do Brasil and EMBRAPA, to facilitate the subsequent development of specific programs. Ten employees will leave immediately to obtain specialized training abroad for a year. Upon their return to Brazil, they will train 150 additional personnel over two years, kicking off a program of training software specialists to train other specialists. [Text] [Brasilia BRASIL CIENCIA in Portuguese 29 April 87 p 1] 8844

CSO: 3699/65

SEI'S NEW DIRECTOR REVEALS FLEXIBLE ATTITUDE TOWARD U.S.

Rio de Janeiro DATANEWS in Portuguese 13 Apr 87 pp 6, 7

[Interview with SEI Director Jose Ezil Veiga da Rocha by Mari-Angela Heredia: "Jose Ezil Veiga da Rocha, New Director at SEI"; date and place not given; first paragraph is material in italics at upper right]

[Text] Having served in SEI since 1981, where he started out as Armed Forces coordinator, the new director does not claim to decentralize policy decisions, but grants total autonomy to regional offices.

The appointment last week of Cmdr Jose Ezil Veiga da Rocha as director of the Special Secretariat for the Computer Industry [SEI] ended speculation that had been going on since early in the year when José Rubens Doria Porto resigned for personal reasons. For some time, Minister Renato Archer hoped that Doria would return to his desk at SEI, but as time passed, advisers close to the minister insisted on resolving the matter, computer companies were encountering problems and SEI employees were awaiting clear leadership.

Thus last Wednesday, Minister Archer announced his decision from the president's office. At 53, Jose Ezil Veiga da Rocha became director of SEI. A native of Rio de Janeiro, officer in the Navy and a specialist in electronics, he joined the reserves in 1980 as captain. He served in various positions under the navy minister and in the general staff of the fleet, the Naval Warfare School as an instructor, and in the military affairs office of the president of the Republic. He was a member of the Brazilian Naval Commission in Europe, which supervised the building of frigates and submarines in England and minesweepers in Germany.

In 1981, he became Armed Forces coordinator for SEI, subsequently rising to the position of undersecretary for strategic operations. In 1984, he became executive secretary for Col Edison Dytz. Under the New Republic, when the Ministry of Science and Technology was established, Doria Porto was appointed to head the secretariat, and Cmdr Veiga da Rocha stayed on as executive secretary.

After nearly 3 months as acting director, he was appointed director. On his first day as official director, he gave an exclusive interview with DATANEWS to answer questions about changes in the secretariat, relations with computer companies and the United States, and other issues:

DATANEWS: Were you expecting this appointment?

Da Rocha: I was surpised. Of course, I was not so naïve that I didn't think I was being considered for the job, but I had never spoken to the minister about it.

DATANEWS: In the opinion of a number of computer businessmen, you have performed well in the first few months as acting director of SEI. How do you judge your performance?

Da Rocha: I don't see any difference between what I have done in the last few months and what I had been doing for years before. Perhaps they (computer businessmen) saw certain actions that were just coincidentally taken now as an indicator, and by these I mean the action taken on the import issue. I think Doria would have done the same thing. Last year, there was a transition period while the government was being installed and we didn't have any guidelines. We were mired in lengthy discussions on the quota, which dragged on through May. To put the cart before the horse for a moment, last year's experience is reflected again this year. Conditions in Brazil this year were much more complicated than last year. Before, they were complicated in the administrative sense. Now we have been faced with a difficult exchange situation since the end of last year. Of course, this forced us to take stronger action. This is all that happened. There has not been any difference at all.

DATANEWS: How does the import situation stand now?

Da Rocha: I think very positive political solutions have been found. Never have we had so much political support from the Ministry of the Treasury, especially from Minister Funaro, and from CACEX. Now for the real nitty-gritty: the availability of funds to translate all this political goodwill into an efficient import procedure. Obviously, we are having difficulties because of the exchange restrictions that are now in effect in Brazil.

DATANEWS: Is the picture black?

Da Rocha: No. Of course, the scenario of discussions with international bankers causes a certain amount of apprehensiveness or even paralysis. I get the impression that the situation will begin to improve in May.

DATANEWS: A number of people in the government, when they heard of your appointment, said that you had to be given the job because SEI has become such a complex agency that only someone who knows it well can manage it. What do you think of this comment?

Da Rocha: SEI has become complex--this I cannot deny--because we are doing something new. No one has ever done what we are doing. I am not talking in terms of politics, but in real terms. When you talk about a policy on robotics or local networking, these are areas that have not been handled before. The situation is complex because of its innovative nature. On the

other hand, SEI is a small agency and it should not become a large one. This is a philosophy of mine, that SEI should not become a huge agency with many departments. The group that works here has to be the same team that has always played, working late and at times coming in on Saturdays and Sundays.

DATANEWS: But SEI is an agency that makes decisions about today's technology, and yet its employees are so overworked that they often don't have the opportunity to keep up by attending seminars, trade shows, etc.

Da Rocha: First we must modernize our working procedures. We will soon have a data-processing system commensurate with our requirements. We must also modernize the way we work at SEI. Some things that traditionally have always been done a certain way must be reviewed. I don't need to change methods to improve performance. Only now can we undertake improvement, since we have accumulated experience we didn't have before. We are going to try to be less complex. Another point has to do with the much publicized issue of decentralization. I have my own ideas, which differ a little from Doria's, but I think decentralization has been accomplished.

DATANEWS: What are your ideas?

Da Rocha: We must decentralize day-to-day operations, but policy decisions must come from Brasilia.

DATANEWS: Do you oppose the autonomy of the regional offices?

Da Rochas: No, not in the area of day-to-day operations. If I have a well-structured system in Brasilia, I apply it. It can be done 1,200 km away as easily as it can be done here. But in order to do so, a methodology must be in place that is now being implemented in the agency. Then you will be able to do it anywhere in Brazil. Implementing a policy decision remotely is complicated. In my opinion, the success of a policy does not depend on whether it is understood or misunderstood, but on very intimate familiarity among people.

DATANEWS: As executive secretary, you were deeply involved with the flap with the United States. What is the current status?

Da Rocha: Relations with the United States are quite complex, but have been more civilized lately. Both sides have been involved in exchanging ideas. We always describe the situation in terms of an exchange of ideas and clarifications, not negotiations to change anything. As questions are answered, there are two results. On one hand, it may be said that the issues are clearer and the climate has improved. On the other hand, the most difficult questions remain. My expectation is that the most difficult questions, software and investment, will lead to a more cordial climate. The computer act promotes changing the state of technological capabilities in Brazil. We are at phase X and must go on to the next phase. If this can take place smoothly, without friction with the United States, with the natural cooperation of American companies to which we have become accustomed (and if the

process is accompanied by the presence of American companies in critical areas) for several years, the opportunities we will have will be completely different from those we have today. What is more difficult and less flexible is the push for a determined change of status.

DATANEWS: Is the law achieving its objectives?

Da Rocha: Of course. It will be an ongoing process and will have to adapt to new functions. Article 9 provides for this. The law was not intended to hinder foreign investment in Brazil, but to change the status not only of Brazilian companies, but of Brazil itself. The computer companies are the most obvious front, but there are also the universities. All this has to change. We must progress beyond the present stage, and as this takes place, the country will be stronger economically. So, of course, the terms of our relations with the world will change and the law will have achieved its objective.

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